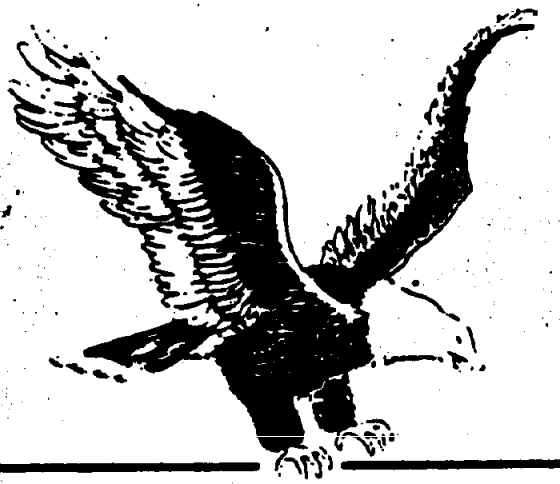
IRP 79-1

INSTALLATION ASSESSMENT
OF
TOOELE ARMY DEPOT

REPORT NO. 141

DECEMBER 1979



US ARMY
TOXIC AND HAZARDOUS MATERIALS AGENCY

ABERDEEN PROVING GROUND, MARYLAND 21010

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INSTALLATION ASSESSMENT

OF

TOOELE ARMY DEPOT

REPORT NO. 141

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ABSTRACT

A records search was conducted to assess the environmental quality of Tooele Army Depot (TEAD) with regard to the use, storage, treatment, and disposal of toxic and hazardous materials and to define any condition which may adversely affect health and welfare or result in environmental degradation.

The review of records identified the major areas of potential contamination as burial sites, testing areas, explosives washout areas, industrial areas, and burning and demolition areas. The major contaminants suspected include chemical agents, plating rinse waters, and residue from explosives washout operations.

The potential for contaminant migration exists on both the North and South areas of TEAD. In the North Area, the site of primary concern is the southwest corner (demolition grounds and 'Chemical Range') which is located in the groundwater recharge zone. In the South area, the major areas of contamination are the mustard storage areas, burial areas, and demolition grounds.

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I. GENERAL

A. Purpose of the Assessment

To assess the environmental quality of Tooele Army Depot (TEAD) with regard to the use, storage, treatment, and disposal of toxic and hazardous materials and to define any conditions which may adversely affect health and welfare or result in environmental degradation.

B. Authority

DARCOM Regulation 10-30, Mission and Major Functions of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) 22 May 1979.

C. Introduction

1. In response to a letter from Project Manager for Chemical Demilitarization and Installation Restoration (PM CDIR), now USATHAMA, requesting the identification of potentially contaminated installations, the Commander, U.S. Army Depot System Command Headquarters (DESCOM) identified TEAD as such an installation.

2. Presurvey instructions were forwarded to TEAD on 11 October 1978 to outline the assessment scope, provide guidelines to TEAD personnel, and obtain advance information for review by the Record Search Team prior to the onsite search.

3. TEAD personnel were briefed by USATHAMA on the Installation Restoration Program on 6 December 1978 prior to the onsite records search.

4. Various Government agencies were contacted during the period of 15 October through 27 November 1978 for documents pertinent to the records search. Agencies contacted include:

a. Department of Defense Explosives Safety Board (DDESB).

b. U.S. Army Environmental Hygiene Agency (USAEHA).

c. U.S. Army Depot Support Command Headquarters (DESCOM).

d. Department of the Army Chemical Systems Laboratory (CSL).

e. U.S. Army Engineer Waterways Experiment Station (WES).

5. The onsite phase of the search was conducted from 6 through 15 December 1978. The following personnel from the Installation Restoration Branch, Environmental Technology Division, Chemical Systems Laboratory (CSL), Aberdeen Proving Ground, Maryland; and the Robert B. Balter Co. (Contractor) were assigned to the Team and prepared the report:

a. Mr. Donald Gross, Team Leader, Chemical Engineer (CSL).

b. Mr. John Bane, Assistant Team Leader, Chemist (CSL).

c. Mr. Ronald Kassel, Chemist (CSL).

d. Mr. George Norris, Ammunition Specialist (CSL).

e. Ms. M. Claire Currie, Ecologist (CSL).

f. Mr. Robert Benson, Geologist (Robert B. Balter Co.).

6. In addition to the review of the records, interviews were conducted with former and present TEAD employees. A ground tour and overflight were conducted in the TEAD North and South Areas; photographs taken during the tours are included as Appendix A.

7. The findings, conclusions, and recommendations are based on the records and statements made available at the time of the search.

D. History [1,2,3]

1. Location

Tooele Army (TEAD) is located in Tooele County in West Central Utah (Figure 1). The TEAD complex consists of three physically separated areas.

a. The North Area, originally the Tooele Ordnance Depot, comprises 10,007 hectares and is situated approximately 57 kilometers southwest of Salt Lake City, Utah.

b. The South Area, the former Deseret Chemical Depot, comprises 7,836 hectares in Rush Valley, and is approximately 27 kilometers south of the North Area.

c. The Non-Tactical Generator and Rail Shop Division of the Maintenance Directorate is located within the boundary of Hill Air Force Base, approximately 24 kilometers north of Salt Lake City.

2. Mission

TEAD's mission is to operate a supply depot providing for the receipt, storage, issue, maintenance, and disposal of assigned commodities; to provide installation support to attached organizations; and to operate such other facilities as may be assigned.

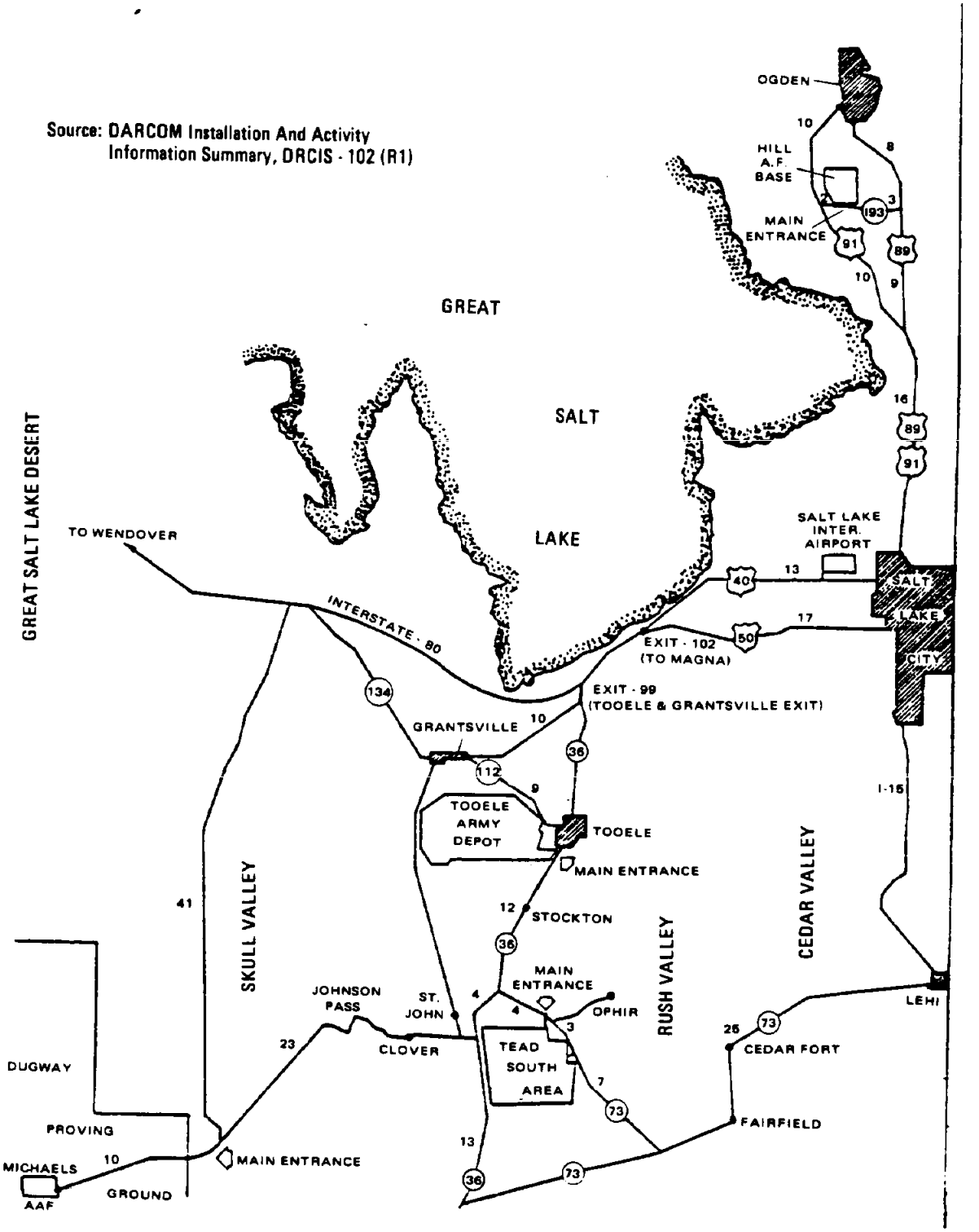

Figure 1. Tooele Army Depot Location Map

3. Historical Summary

The Tooele Ordnance Depot was established 7 April 1942 by the Army Ordnance Department to function primarily as a World War II Reserve or "Back-up" Installation. This function involved the storage of stocks for Benicia Arsenal and the Stockton Ordnance Depot, California Inland Ports, through which World War II supplies, automotive combat vehicles, and ammunition were shipped to Pacific Theater of Operations. It was redesignated Tooele Army Depot (TEAD) 1 August 1962.

Construction of facilities was completed in January 1943. The project included igloos, magazines, administration buildings, military and civilian housing, roads and hardstands for vehicle storage, and various other allied appurtenances.

Since World War II, TEAD's mission has been gradually altered and expanded to include the support of other Army installations in the Western United States.

The installation was designated a subdepot of Ogden Arsenal (in Ogden, Utah) in March 1947. In November 1949, Tooele subdepot was again designated as the Tooele Ordnance Depot and Ogden Arsenal was designated as a subdepot under Tooele. Ogden Arsenal was once again declared an arsenal in 1950, but was discontinued in 1955, and its mission transferred to Tooele.

Construction of the Deseret Chemical Depot was started in 1942 and completed in 1943. It predominantly sustained a chemical munitions mission, i.e., storage and maintenance of Chemical Warfare Service Material. The first major expansion occurred in May 1955 when the installation was redesignated the Deseret Depot Activity and placed under the command of TEAD. It ultimately became known as the "South Area." On 30 March 1961, two major west coast ordnance installations (Benicia Arsenal located near Sacramento, California, and Mt. Ranier Ordnance Depot located near Tacoma, Washington) were deactivated and their missions were transferred to TEAD. The transferred missions were Guided Missile Rebuild, Tires and Tubes Rebuild, Calibration of Test Equipment, and other similar maintenance missions.

From June to September 1970, maintenance mission responsibilities for topographic equipment, troop support items, construction equipment, power generators and serviceable assets (requiring inside/outside storage) were transferred from Granite City Army Depot, located near Granite City, Illinois, to TEAD.[4]

In August 1973, Umatilla Depot Activity, Hermiston, Oregon, was the first depot satellite assigned to TEAD. In September 1975, Navajo Depot Activity, Flagstaff, Arizona and Fort Wingate Depot Activity, Gallup, New Mexico were reassigned from Pueblo Army Depot to TEAD by Army Materiel Command (AMC) General Orders 249, 151.

The latest organizational change (AMC General Order 104), effective 1 July 1976, reduced the status of the Pueblo Army Depot to that of a depot activity and assigned the administration of this facility to TEAD. Therefore, TEAD is presently responsible for four separate depot activities, i.e., Umatilla, Navajo, Fort Wingate, and Pueblo.

In addition to the assumption of administrative responsibility for the various remote depot activities, TEAD has been assigned the responsibility for various tenant activities in both the North and South Areas.

The Chemical Demilitarization Field Office was established at Tooele Army Depot in January 1974, taking the place of the Edgewood Arsenal Technical Representative Office. This field office of PM CDIR is responsible for advising and assisting all chemical demilitarization operations at Dugway Proving Ground and Umatilla Depot Activity, with Toole Army Depot acting as liaison office between the office and the commanders of these installations.

The Defense Supply Agency, Defense Property Disposal Office was assimilated by TEAD in recent years as a non-DARCOM tenant activity of the Defense Supply Agency, Defense Property Disposal Region of Ogden, Utah. This activity is responsible for all property disposal functions at TEAD.

E. Leases

1. Industrial

a. Approximately 0.8 hectare of land within the Demolition Range of the TEAD North Area is leased by Cook Association, Inc., Merrill A. Cook, Managing Director, under Contract DACA05-1-77-500. The area is utilized for experimental testing of explosion formulations. The present lease ends on 30 September 1981. The area has been used periodically since 1952 by the Institute of Metals and Explosives Research at the University of Utah, under the direction of Professor Merrill A. Cook.

b. Two igloos in C block of the North Area have been leased by the IMC Chemical Group, Inc. Trojan Division under Contract DACA05-1-75-720, for the storage of Composition A-3 explosive (limit 233,391 kilograms).

2. Agricultural/Grazing Leases

TEAD presently has two agricultural/grazing leases. In the North Area, under contract number DACA05-1-76-807, the Grantsville Soil Conservation District leases 8,425 hectares for livestock grazing at a cost of $8,160 per year. This contract expires 30 October 1980. Approximately 800 cows and 1,220 sheep are grazed from December to April 15. In the South Area, under contract number DACA05-76-503, Mr. Dean B. Smith leases 356 hectares for livestock grazing and farming at a cost of $1,876 per year. This contract expires 31 March 1980. Fifty cows are grazed from December 59 mid-April, and 8.2 hectares of alfalfa are planted.

These grazing areas are watched carefully for signs of overgrazing or trailing to the five water holes in the North Area or to the one water hole in the South Area. The maximum grazing capacity may not exceed 5,440 animal unit months per year.

F. Legal Actions

No legal actions have been reported.

II. ENVIRONMENTAL SETTING

A. Meteorological Data

TEAD is located in the Great Basin of Lake Bonneville, a region of scattered mountains and broad, intervening valleys and basins. The climate is classified as semi-arid with four well-defined seasons. Summer is hot and dry, spring and fall are cool, and winter is moderately cold. The mountain barriers west of Utah, which run north-south, restrict the movement of weather systems into the area, resulting in an average yearly precipitation of only 38 centimeters per year. Precipitation varies widely from season to season. Winter snowfall accounts for nearly half of the total annual precipitation. The average snowfall depth is 15 to 21 centimeters, with a continuous snow cover duration averaging 29 days. July is the hottest month, averaging 24.8°C with an extreme of 41.7°C. January is the coldest month, averaging -2.2°C, with a record low of -30°C. Winds are usually light, although occassional high winds have occurred in every month of the year, particulary in March. Wind speed has an annual average of 14 kilometers per hour. The growing season is quite long, averaging over 5 months in length. The average spring and fall killing frost dates are 1 April and 25 October, respectively. Relative humidity averages 44 percent.

B. Geology

1. Physiography

TEAD is located in the Great Basin section of the Basin and Range physiographic province. The North Area of TEAD is located in Tooele Valley and the South Area is located in Rush Valley. Tooele and Rush Valleys occupy the block faulted, structural trough between the north-south trending Oquirrh Mountains on the east, and the Onaqui or Stansbury Mountains on the West. Near Stockton, the trough is crossed by a low divide that separates the trough into two drainage basins. During Pleistocene time, Tooele Valley and most of Rush Valley were occupied by ancient Lake Bonneville.

The mountains bordering Tooele and Rush Valleys are composed mainly of limestone and quartzite of Palezoic age. The valley is filled with alluvial, colluvial, and lacustrine deposits of Tertiary and Quaternary age. This valley fill consists of the Salt Lake Formation of Pliocene age, pre-Lake Bonneville and Lake Bonneville deposits of Pleistocene age, and deposits of Recent age, which include alluvium, lake beds, and dunes. The valley fill is unconsolidated, whereas rocks older than the Salt Lake Formation probably are consolidated. The thickness of the valley fill ranges from less than 91 meters to more than 2,135 meters.

Figures 2 and 3 indicate the areal distribution of the geologic formations of the North and South Areas, respectively. Both the North and South Areas are covered entirely by Quaternary deposits. Descriptions of the formations are as follows:

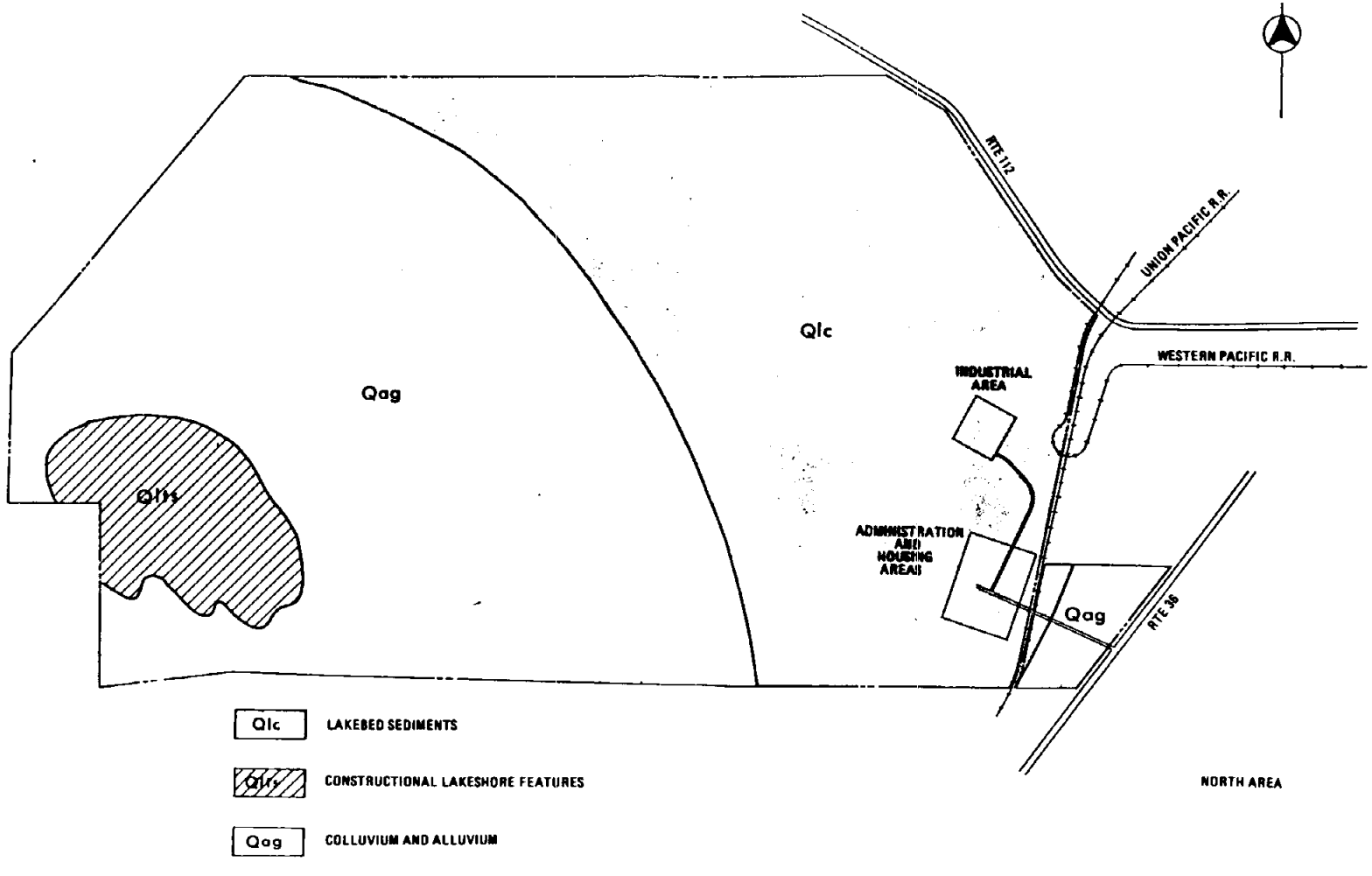

Figure 2. TEAD North Area Geology Map

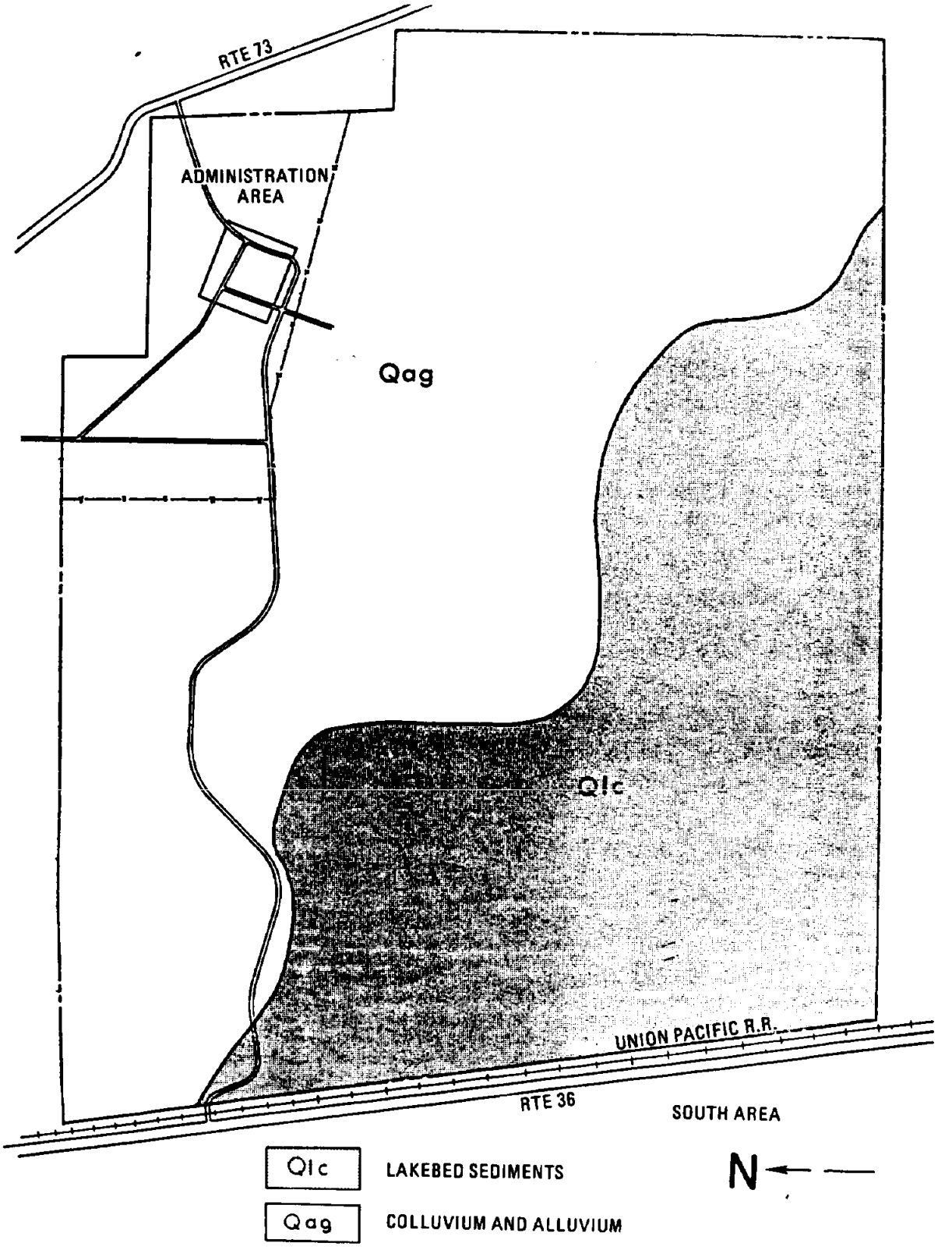

Figure 3. TEAD South Area Geology Map

a. Lakebed sediments (Qlc) consist mostly of dry clay or dust, and are poorly drained, with enough salt to prohibit agriculture.

b. Constructional lakeshore features (Qlts) consist of sandy terraces, spits, and bars.

c. Colluvium and alluvium (Qag) are mostly stony and unfit for agricultural crops.

There are several faults of Tertiary and Quaternary age in Rush and Tooele Valleys, but none are located in TEAD.

Runoff in the North Area occurs through both surface and underground drainage systems. The surface system is approximately 19,020 meters in length, primarily located in the maintenance area, and terminates on the installation. The underground drainage system consists of approximately 13,655 meters of vitrified clay pipe, ranging in size from 25 centimeters to 107 centimeters in diameter. The underground system serves the administration area and supplements the surface swales in the maintenance and supply area.

In the South Area, a surface drainage network approximately 41,330 meters in length controls the limited runoff. The drains terminate on the installation, except for one which terminates on the west boundary where it joins the drainage system of Utah State Highway 36 and the Union Pacific Railroad.

2. Surface Waters

a. Topography

The North Area of TEAD is situated on the desert floor of Tooele Valley and is flanked on the west, south and east by mountains. Therefore, any generated drainage moves north toward the Great Salt Lake, which has no outlet. The base slopes to the north with moderate slopes (5+ percent) in the southwest portion and flat slopes (0.5 to 2 percent) in the north and central areas. Elevations on the installation vary from 1,600 meters to 1,353 meters above mean sea level (msl).

The South Area of TEAD lies in the desert floor of Rush Valley which is encircled with mountains. Thus, the valley possesses interior drainage; i.e., there is no surface drainage out of the valley. This installation slopes from northeast to southwest with moderate slopes (5 percent) in the northeast to an almost flat portion in the southwest. Elevation in this area varies from 1,715 meters to 1,533 meters above msl.

b. Drainage

In both the North and South Areas of TEAD, there are no permanent streams or rivers. Drainageways contain ephemeral streams which flow only in direct response to rainfall. With one exception in the South Area, runoff on the installations never reaches the boundaries; it travels only a short distance before percolating into the bed of the drainageway. Although water does flow in the mountain streams surrounding the TEAD installations, flow from them rarely reaches the military reservations. Water from these streams either is utilized for irrigation, infiltrates into the groundwater reserves, or is lost through evapotranspiration.

3. Subsurface Waters

a. TEAD North Area

Groundwater in Tooele Valley is stored within the valley fill. Most usable water is contained within the granular strata which form the principal aquifers. These aquifers are not continuous across the basin. In the southern end of the valley, where TEAD is located, the wells are in a water table condition. Further north, the principal aquifers are confined by overlying fine-grained strata which cause artesian conditions in wells.

Almost all groundwater within the valley is a result of infiltration of precipitation within the drainage basin. Available evidence shows that very little groundwater enters Tooele Valley through subsurface channels from adjacent valleys. The groundwater reservoir is recharged primarily in the gravel benches at the base of the mountains generally above 1,590 meters; however, where granular soil extends further into the valley floor, the recharge zone may drop as low as 1,554 meters in elevation. These granular soils allow canyon runoff and water contained in rock fractures to enter the valley sediments. The most significant areas of recharge are probably in the southeastern and southwestern corners of the valley where the major water-producing canyons (Middle, Settlement, Box Elder, South Willow, North Willow, and Davenport Canyons) leave the mountains.

Recharge in these canyonds occurs as seepage from streams and underflow of stream channels. The canyon washes passing through the North Area are shown in Figure 4. Some recharge of principal aquifers may also occur by direct infiltration from the valley floor in the southern end of the drainage basin, where aquifers are unconfined; however, the amount of recharge is probably minimal.

The direction of groundwater flow basically follows ground contours flowing downhill and north toward Great Salt Lake. Major groundwater discharge is by water supply wells, springs, and evapotranspiration. The main areas of well discharge for domestic water supply are Grantsville, Erda, and Tooele. The North Area is located at a higher elevation and to the south of Grantsville and Erda. Tooele's wells are located generally east and uphill from TEAD.

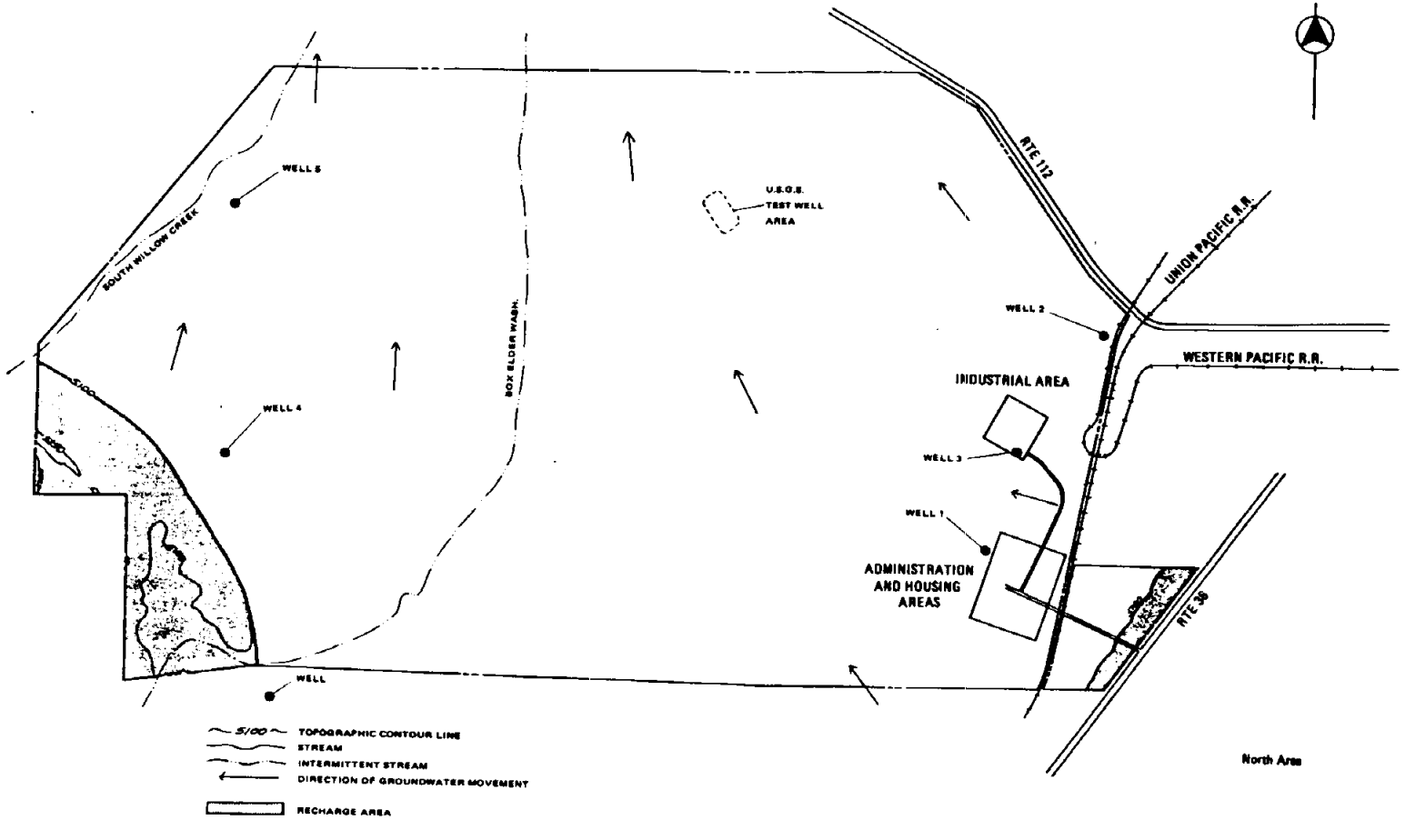

Figure 4. TEAD North Area Hydrology Map

Five wells are presently used for TEAD North Area's water supply and a sixth well is being developed for future use. The locations of these wells are shown in Figure 4. Groundwater in these water table wells is encountered between depths of 103 and 190 meters below the ground surface. Other pertinent detailed well data are presented in Table I. In addition to the deep aquifer tapped by the wells, water is also reportedly encountered in small quantities at depths of 5.5 to 6.1 meters below the ground surface. This water is probably perched over a fine-grained strata, and quantities of water are reportedly small. It is uncertain if this water mixes with the deeper aquifers, although the common opinion of the U.S.G.S. Salt Lake office is that no mixing occurs. It is likely that the extreme southwestern corner of TEAD is within the valley recharge zone as shown in Figure 4. The elevations of the area are generally correct and Box Elder Wash, a major recharge canyon, passes through that corner of the installation. The Demolition Pits, and perhaps a section of the Chemical Range, are located within the probable recharge zone. Groundwater from TEAD flows north towards the Grantsville-Erda area as shown in Figure 4.

b. TEAD South Area

The South Area is located in Rush Valley, which is directly south of Tooele Valley. Conditions are similar to Tooele Valley concerning groundwater storage and recharge source. Recharge is through gravel benches and alluvial fans surrounding the valley above elevation 1,676 meters. Ophir Creek empties into the valley at the northeast corner of the South Area of TEAD. Two water supply wells in the South Area tap the alluvial fan of Ophir Creek for water supply, encountering groundwater at depths of 88 to 95 meters. These wells tap into an unconfined aquifer. The well for Chemical Agent Munitions Disposal System (CAMDS), in the southwest quadrant of the South Area encountered a water-bearing layer at 105 meters overlain by thick clay deposits. Since the water level in this well is not known, it cannot be determined if the aquifer is confined or unconfined. The data available for each well in the South Area are presented in Table II. Groundwater is found both at the depths tapped by the wells and at a depth of 4.5 to 6 meters. Significant amounts of water are reportedly found at this depth. It is estimated that this water is perched on hard clay deposits, with flow predominantly following the topography.

A groundwater divide through the South Area is shown on Figure 5. The direction of groundwater flow is shown on the same drawing. Water flowing to the north is dissipated by evaporation via Rush Lake or by evapotranspiration from vegetation at the north end of the valley. Water flowing south eventually passes east through Five and Ten Mile Passes.

4. Soil Types

Soils in both the North and South Areas of TEAD are sedimentary, having been deposited to great depths as described in the physiography section of this report. Soils are variable, consisting of clay,

Table I. Groundwater Wells - North Area

Well	Date Completed	Depth (meters)	Static Water Level (meters)	Pumping Water Level (meters)	Casing (ID) (centimeters)	Rated Capacity* (liters/second)
1	1942	233	116	117	51	35.6
2	1942	152	117	118	51	35.0
3	1953	213	110	111	41	33.1
4	1956	238	191	118	30	2.14
5	1972	201	190	unk	20	1.58
6**	1978	131	unk	unk	15	0.44

* Total theoretical pumping capacity of the North Area wells (16 hours/day) is 6,101 m^3/day (1,611,840 gallons/day). (This does not include Well 5 or 6 which are remote, special-use wells.)

** Well 6 in the North Area has a 15.20 centimeter (6") casing installed but no pump. An application for pumping water from this well has been made to the State of Utah by Tooele AD. Water from this well will be used for watering grazing stock (sheep and cattle).

Table II. Groundwater Wells - South Area

Well	Date Completed	Depth (meters)	Static Water Level (meters)	Pumping Water Level (meters)	Casing (ID) (centimeters)	Rated Capacity* (liters/second)
1	1942	123	86.3	87.5	30.5	19.6
2	1942	130	86.9	88.7	30.5	17.2
3	1972	168	unk	61.0	15.2	7.7

* Total theoretical pumping capacity of South Area wells (16 hours/day) is 2,118 m^3/day. This does not include Well 3 which has been shut down due to excessive sand content in the water. This well was drilled to supply water exclusively to CAMDS.)

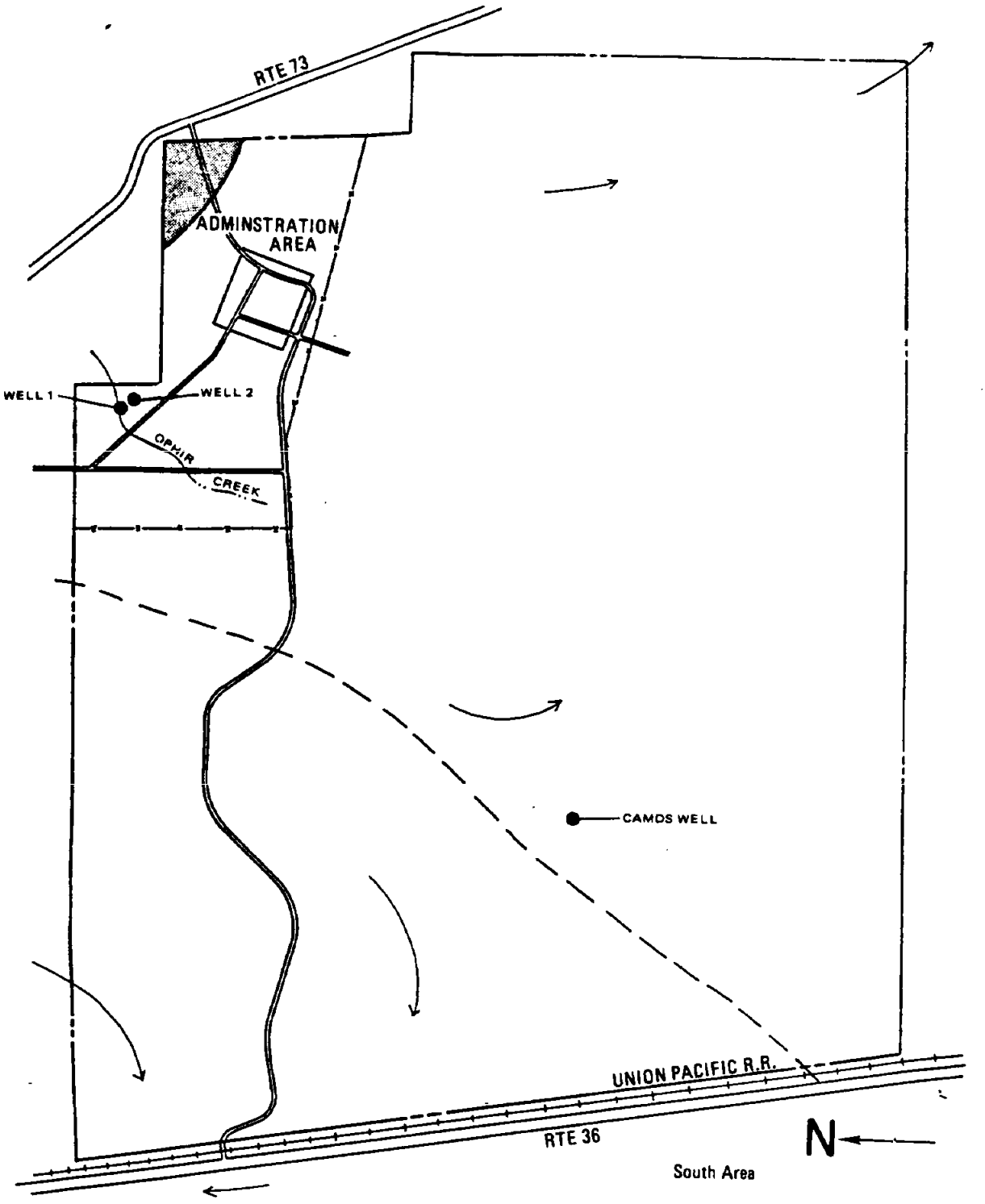

Figure 5. TEAD South Area Hydrology Map

silt, sand, gravel, and cobbles. Generally, however, the upper soil strata tend to be more granular at higher elevations, grading to fine-grained, more impermeable soils in the valley floor. This factor is evident in the South Area. Wells 1 and 2, at relatively high elevation, penetrate mostly granular soil, while the CAMDS water supply well, in the valley floor, penetrates several hundred feet of predominantly clayey soil. The same can be seen in the North Area by comparing more granular well logs for Wells 1, 4, and 5 to the logs of Wells 2 and 3 located at lower elevations. The alternating layers of granular and fine-grained soils account for perched water tables, the presence of more than one aquifer, and the artesian conditions of the lower aquifers. Soils also contain salts and dissolved solids. Fine-grained soils, because of their slow permeability characteristics, contribute more salt to the groundwater than do coarse-grained soils.

The surface soils on both areas have been previously categorized by various studies. In the North Area, surface soils are predominantly granular, being either sand or a mixture of sand and gravel in the foothill and sandhill areas. The north-central area consists of heavier, less permeable desert bench soils. The soil classifications are Ashley Pravelly, Bekins and Jenola Loams, and Mellor Manassa.

In the South Area, surface soils are basically three categories. A silt overlying gravel with occasional hardpan layers is found in the north half of the area. A deep silt soil is found in the south and east areas; some of this soil contains high concentrations of soluble minerals. The third surface soil encountered is black silty soil, located near Ophir Creek. The soil classification widespread in the South Area is Neola Gravelly Loam.

5. Archaeological Sites

A rock outcropping, approximately 457 meters south of TEAD's north boundary fence, contains a large, flat rock used by Indians 2,500 years ago for a writing surface (petroglyph). According to TEAD personnel, these ancient writings have weathered poorly, the degradation accelerating in the last 20 years. In addition, a pit close to the rock outcropping supplied the Indians with dirt which they mixed with animal fat for paint. This pit, although enlarged by more recent settlers, is still of interest. There are no planned efforts at the installation to preserve these valuable antiquities.

C. Biota

1. Native vegetation in the North Area includes sage, bitter vetch, yellow brush juniper, and a number of grasses such as western wheat, cheat, and fescue. Native vegetation in the South Area includes black sage, fringed sage, shadscale, salt grass, and rabbit brush. Numerous plants, trees, and shrubs have been planted for landscaping. Halogeton, a toxic plant, occurs over the entire South Area, and in the past has been responsible for poisoning sheep. There is no prescribed burning on the instal-

lation due to the nature of TEAD's activity. A plant list of the general vicinity is included as Appendix B.

2. Life forms on TEAD include mammals, birds, and reptiles. Nine species of lizards and the Great Basin gopher snake occur here. Mammals include the mule deer, fox, bobcat, rabbit, rodents, and coyotes. A partial mammal list is provided in Appendix B. A few game birds inhabit the sewage lagoons and a number of mourning doves occur on the installation. In addition, the golden eagle and the endangered bald eagle inhabit both the North and South Areas. Perches have been added to numerous power poles to accommodate the eagles. The bald eagle and its habitat are subject to disturbance, and the wildlife management plan does not address the species requirements.

3. There are no hunting or recreational activities at TEAD.

4. The environmental setting of the TEAD South Area was studied in detail and presented in the Final Environmental Impact Statement, Operation of the Chemical Agent Munitions Disposal System at Tooele Army Depot, Utah, March 1977. A copy of this enclosure is presented as Appendix C.

III. DISCUSSION

A. Potential Contamination

1. Installation Operations

a. Industrial Operations

In addition to the demilitarization activities discussed in Section III.A.2.e (below), industrial activity at TEAD has consisted of the care, maintenance, renovation, and storage of ammunition and combat vehicles. TEAD also has performed guided missile and tube and tire rebuild. The South Area has served primarily as a facility for the storage and maintenance of both bulk chemical agents and chemical weapons.

TEAD's Rail Equipment Division, located at Hill Air Force Base (Figure 6), builds and repairs diesel locomotives and railcars, flight simulator cars and bomb scoring cars for the Strategic Air Command, and transport cars for nuclear components and guard quarters cars for the Department of Energy. TEAD occupies eight buildings at Hill Air Force Base, the majority being used as warehouses. The basis for occupation is "on permit" where the buildings are used on a temporary basis. Hill Air Force Base is reimbursed for utilities and waste disposal services. All wastes generated by the shops are handled by Hill Air Force Base, including cleaning and plating wastes.

A summary of past and current TEAD industrial activities is presented in Appendix E, compiled from AEHA Industrial Hygiene reports.

The industrial area (600-series buildings) (location 1, Figure 7) of the North Area has been generating waste waters containing chromium and cadmium (from metal finishing operations), detergents, grease and oil (from steam cleaning and vehicle wash facilities), acids and caustic (from metal cleaning operations), suspended solids, and boiler blowdown. These waste waters leave the industrial area via several outfalls and run to the "spreading grounds" (location 2, Figure 7) where the water percolates into the soil.

For a brief time during the early 1970's, concentrated chromium-containing solutions were treated with sodium metabisulfite to reduce Cr VI to Cr III, the water was allowed to evaporate, and the Cr III-containing residue was buried in alkaline soil. Concentrated liquid wastes containing chromium are now sent to Hill Air Force Base for treatment and disposal under an Interservice Agreement. However, dilute chromium-containing solutions still enter the storm sewer system and run to the Spreading Ground. Cadmium-containing waste streams have not been generated recently.

A recent USAEHA study[5] has addressed the situation and said in part that: "So long as no concentrated process baths are dumped from metal finishing operations, and provided the waste waters are redistributed over a wide area, waste water disposal on the spreading ground is an acceptable practice. Considering the geologic setting.....the potential for groundwater pollution by activities in the Tooele Area with reference to cadmium and chromium is not great." "However, the possibility remains of contaminating supplies of off-depot users."

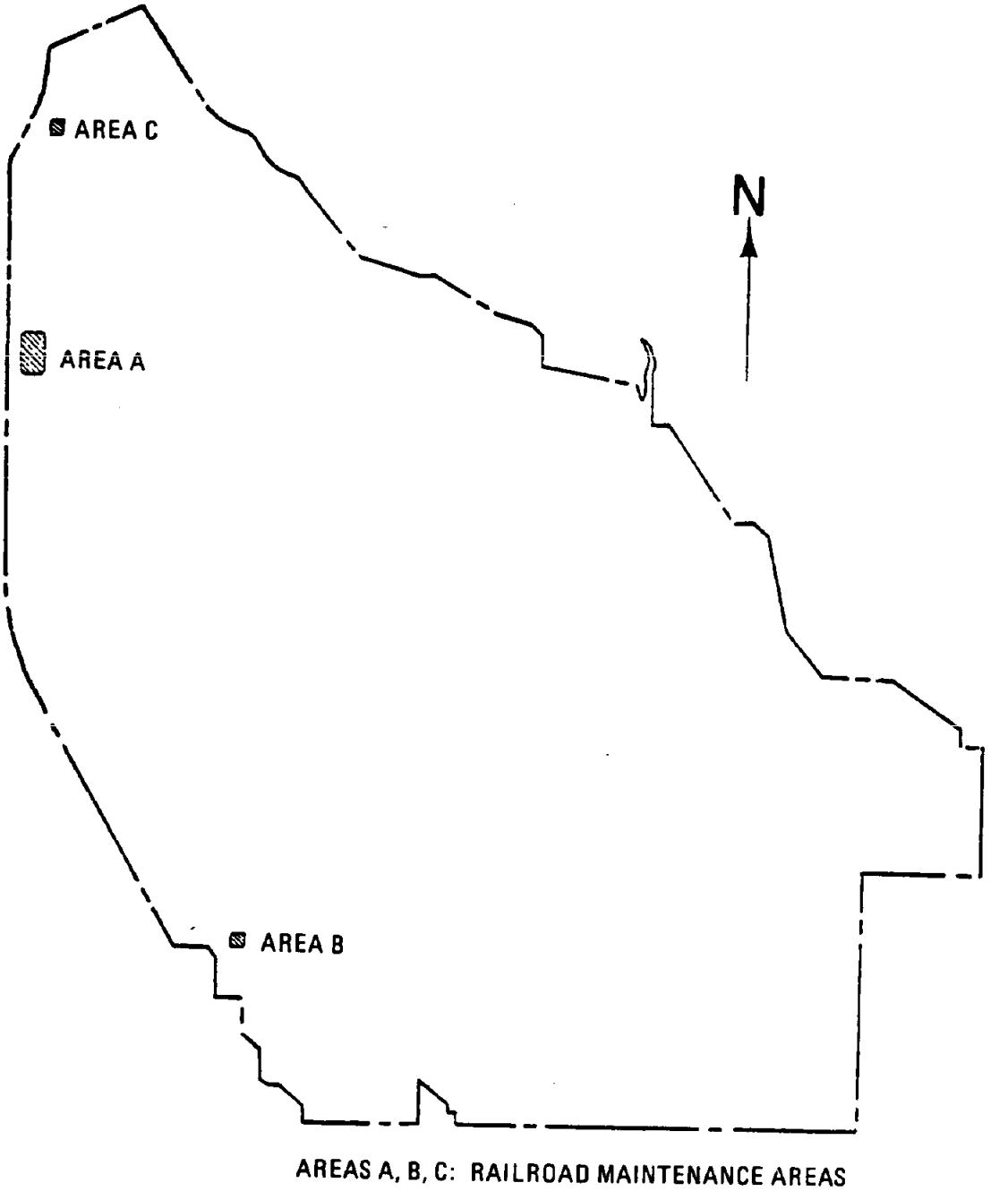

Figure 6. . Hill Air Force Base Areas Associated With Tooele Army Depot

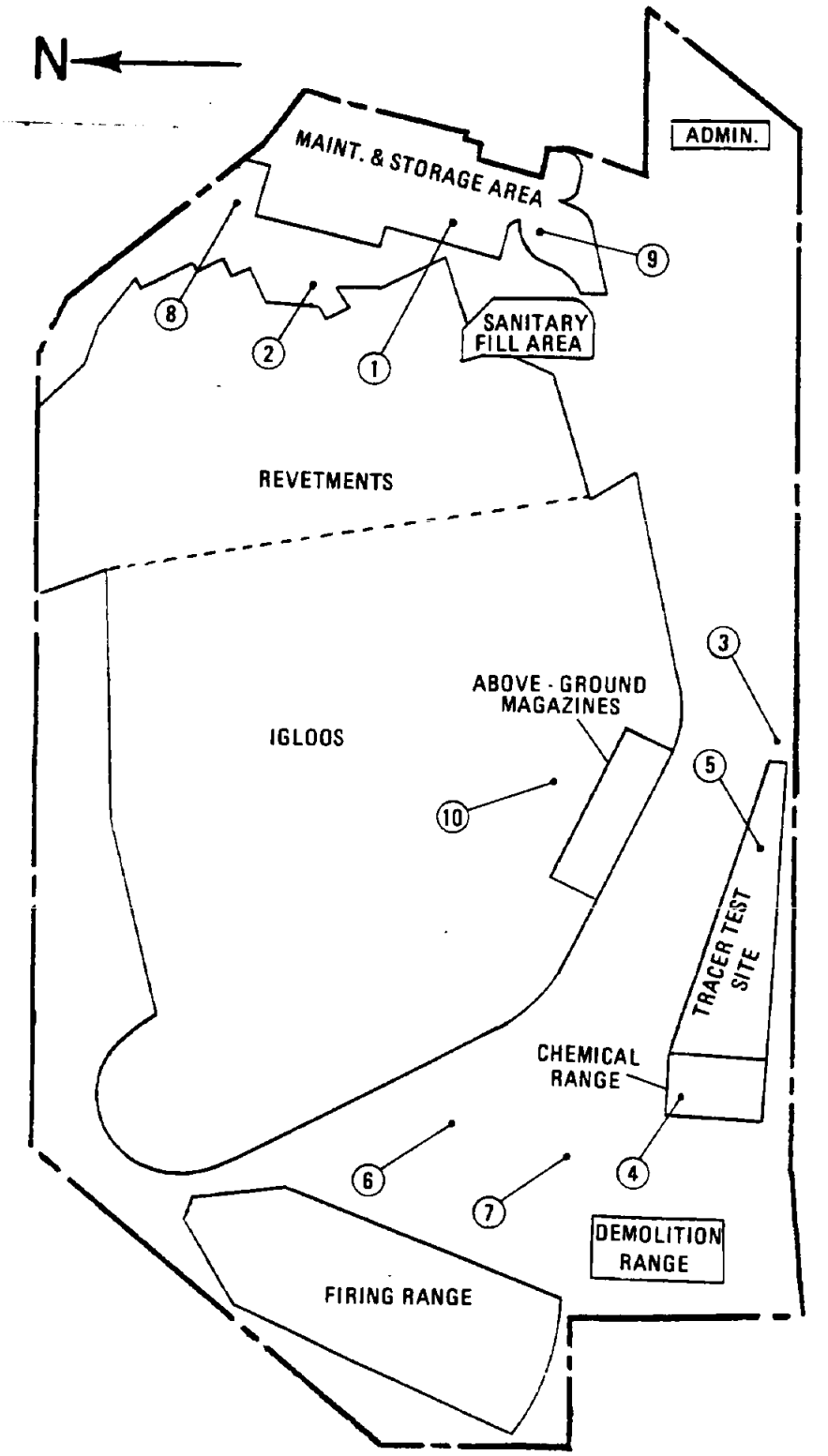

Figure 7. TEAD North Area Activities

Location No.	Activity
1	Industrial Area
2	Waste Water Outfall/Spreading Grounds
3	Surveillance Test Site
4	Chemical Range
5	Firing Course
6	AEO Deactivation Furnace Site
7	AEO Demilitarization Facility
8	Radioactive Waste Storage Yard
9	Pesticide Storage
10	Ammunition Workshop Area

Figure 7. TEAD North Area Activities - Legend

Waste liquids containing chromic acid from Building S-33 were sent to septic tank 56.

Building T-600 (location 1, Figure 8) in the South Area was used for the renovation of chemical munitions, including white phosphorous (WP) grenades which exuded WP. Waste-cleaning solutions went to a leaching pit across Cross Street from Building T-600, possibly leading to slight WP contamination of this area. Chromium contamination remains in this area.

b. Lessee Industrial Operations

The only lessee operations at TEAD have been:

(1) The test firing of small quantities of ammonium nitrate based experimental slurry explosives at the demolition grounds located in the North Area (Cooke Associates).

(2) The use of two igloos in C block (North Area) for the storage of Component A-3 explosive (IMC Corporation).

(3) The transfer and sale of phosgene in the South Area contracted by a contractor (unknown) in the late 1950's.

None of these operations would have led to potential contamination.

c. Laboratory Operations

The South Area Laboratory (a potential source of waste) in Building S-541 is where analysis of agents in storage at TEAD is accomplished. Until December 1976, the agents processed were mustard agents (H, HD, HT), AC, CK, and CG. Waste and excess samples were burned at the demolition grounds.

Toxic agent GB has been processed since December 1976; toxic agent VX since October 1978. Current practice is to decontaminate the agent at the bench and then to deliver it to a 1,000 gallon sump in which a sodium hydroxide concentration of at least 5 percent is maintained. Prior to the periodic removal of the sump contents, they are analyzed to insure both the proper caustic concentration and the absence of the agent, and then are sent to the Chemical Agent Munitions Disposal System (CAMDS) site where they are dried to yield salts.

Other activities at this laboratory have been to analyze crankcase oil and antifreeze for the motorpool, and to analyze, on a weekly basis, potable water for the presence of bacteria. Perimeter stations at the South Area have been established for the purpose of monitoring for airborne agents and emissions arising from the CAMDS site. The laboratory is supporting this activity.

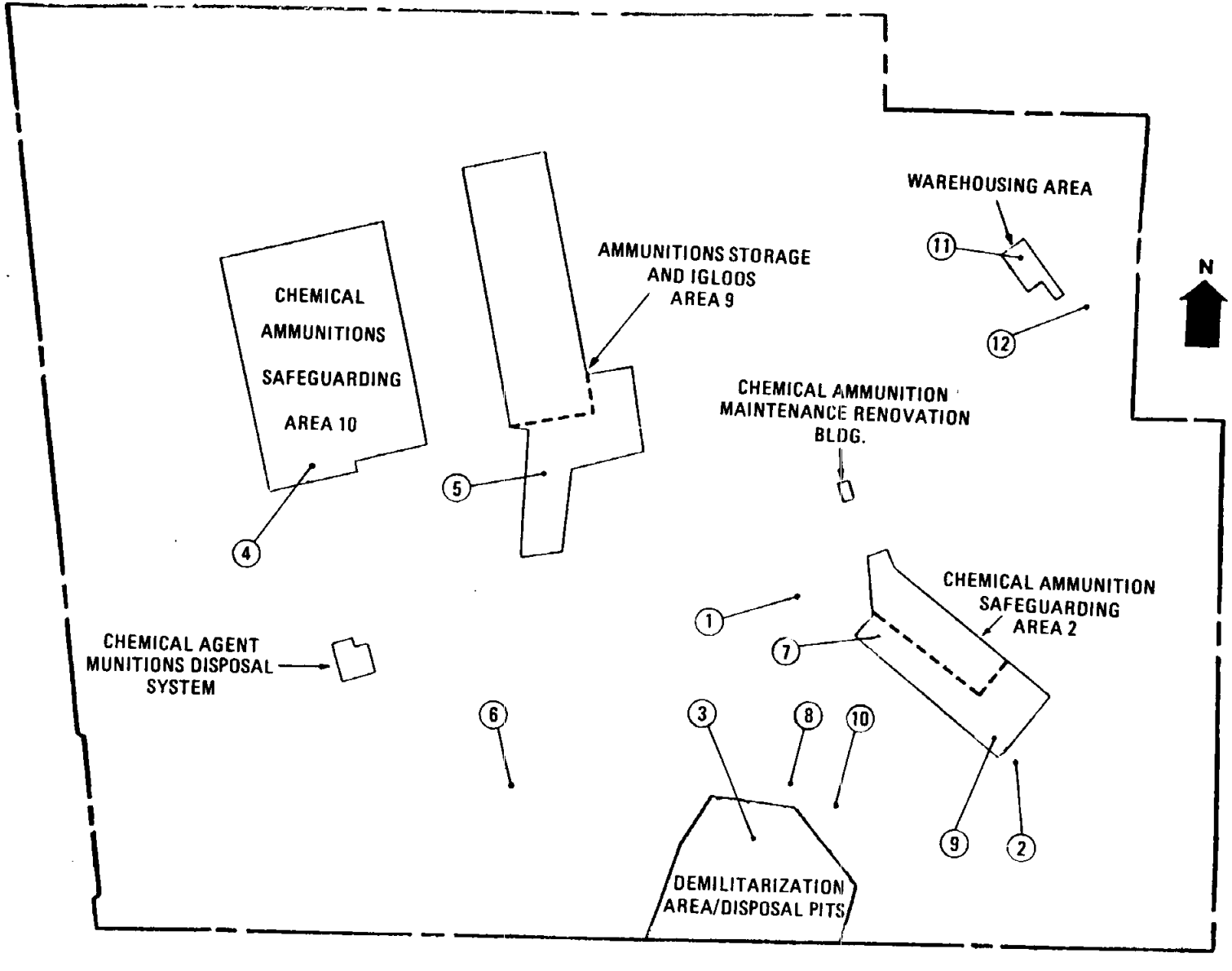

Figure 8. TEAD South Area Activities

Location No.	Activity
1	500-Series Buildings and Site of Former Building T-600
2	Disposal Pit
3	Demilitarization Area/Disposal Pits
4	"Gravel" Pit
5	Warehouse No. C4002
6	HE Demolition Area/Windrows
7	Former Mustard Holding Area
8	Demolition Ground Holding Area
9	Site of VX Spill
10	Building T-3250, T-3251
11	Building S-118
12	Sanitary Landfill Area

Figure 8. TEAD South Area Activities - Legend

In the North Area, laboratories are operated at Building 594 for the calibration of electronic and optical equipment; at Building 1355 for the analysis of deactivation furnace gases, and at Building 1376 for the measurement of overpressure. An x-ray laboratory (L-23) and a Photographic Laboratory near the Officer's Club are also located in the North Area.

d. Proof and Surveillance Tests

Proof testing of ammunition or weapons has not been conducted at TEAD, either in the North or South Areas as determined from available records and interviews with personnel.

(1) North Area

Surveillance testing has been done from 1942 until the present in the North Area. The three areas utilized for this purpose are the Surveillance Test Site, the Chemical Range, and the Firing Course (locations 3, 4, and 5, Figure 5). Figures 9, 10, and 11 are enlargements of these areas.

The Surveillance Test Site is used for the testing of representative numbers of HE-filled munitions, fuzes, and propellants.

Chemical and pyrotechnic-type munitions, excluding toxic agent-filled, are tested on the Chemical Range. Munitions tested include flares, smoke grenades, smoke pots, WP-filled grenades and projectiles, incendiary items such as bombs, grenades, pouch and document destroyers, riot-control agent-filled munitions, and flame thrower igniters.

Small arms ammunition up to .50 caliber are test fired on the Firing Course. Tracer ammunition tests have not been conducted on this course since 1976.

Most of the munitions tested, except the small arms, are statically initiated; some dynamic firing of projectiles and rockets has been done. The test sites are policed after tests and all malfunctioned items are recovered, examined, and destroyed.

Surveillance Division personnel also conduct tests involving hot and cold treatment of munitions to determine the effect of these temperature extremes on munition performance and storage capabilities.

Surveillance testing was conducted on the rifle range area around Buildings 1349 and 1350 until the early 1970's. There were a bomb bumping facility and a drop tower for HE-filled and nontoxic-filled chemical munitions. Testing in this area was discontinued in the early 1970's due to the erection of a deactivation furnace in the area. All malfunctioned munitions were recovered or destroyed in place and the area is considered clear of unexploded ordnance (UXO).

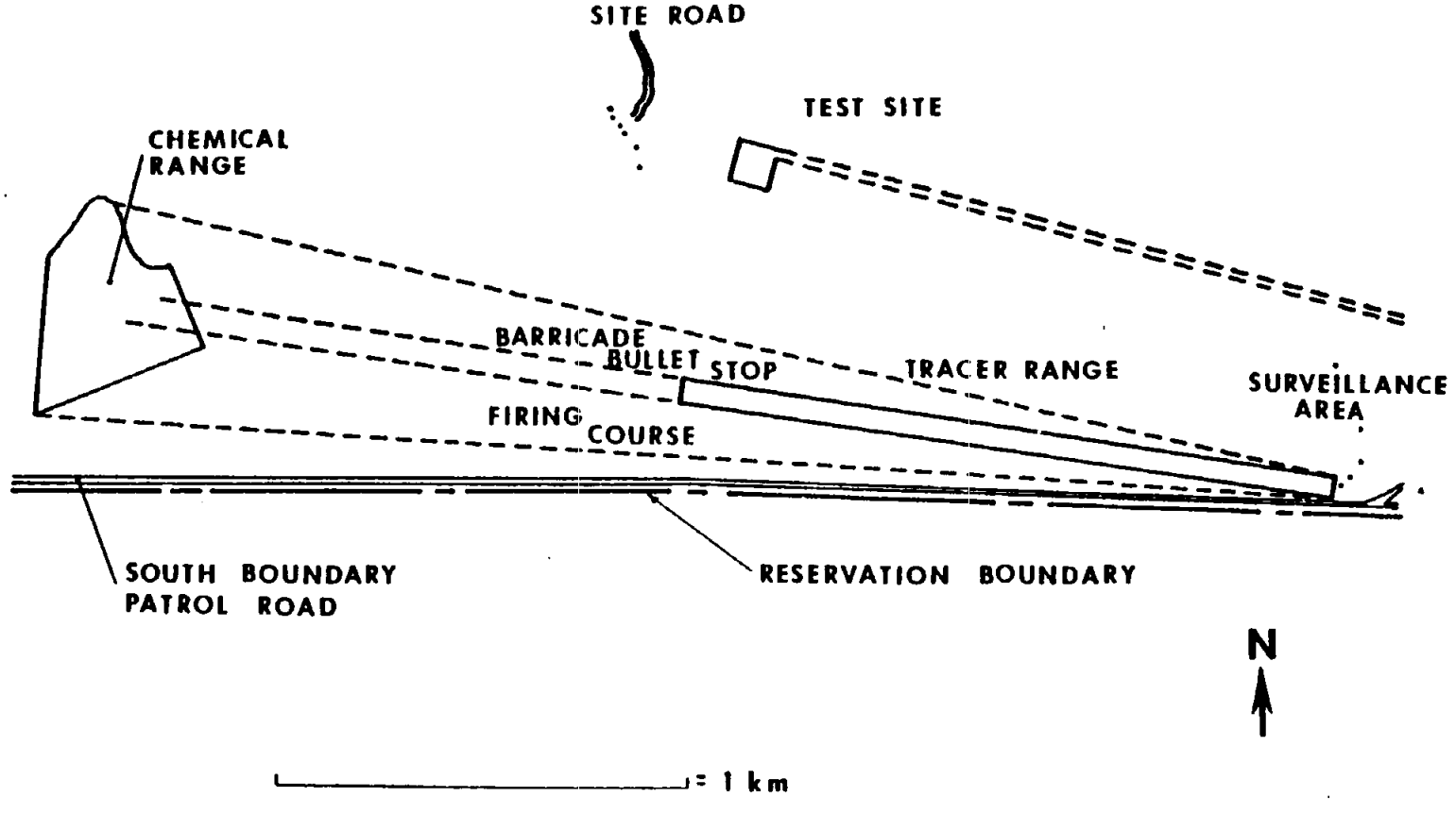

Figure 9. Enlargement of Firing Course - Surveillance Test Site in TEAD North Area

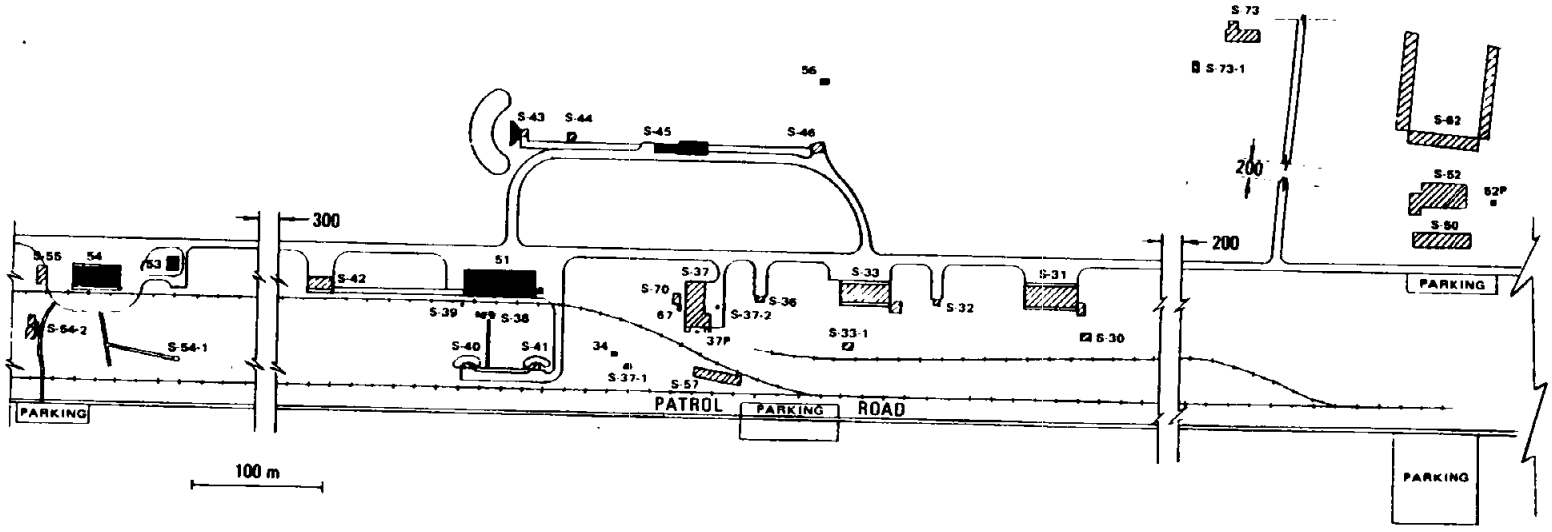

Figure 10. Enlargement of Ammunition Workshops Area in Tead North Area

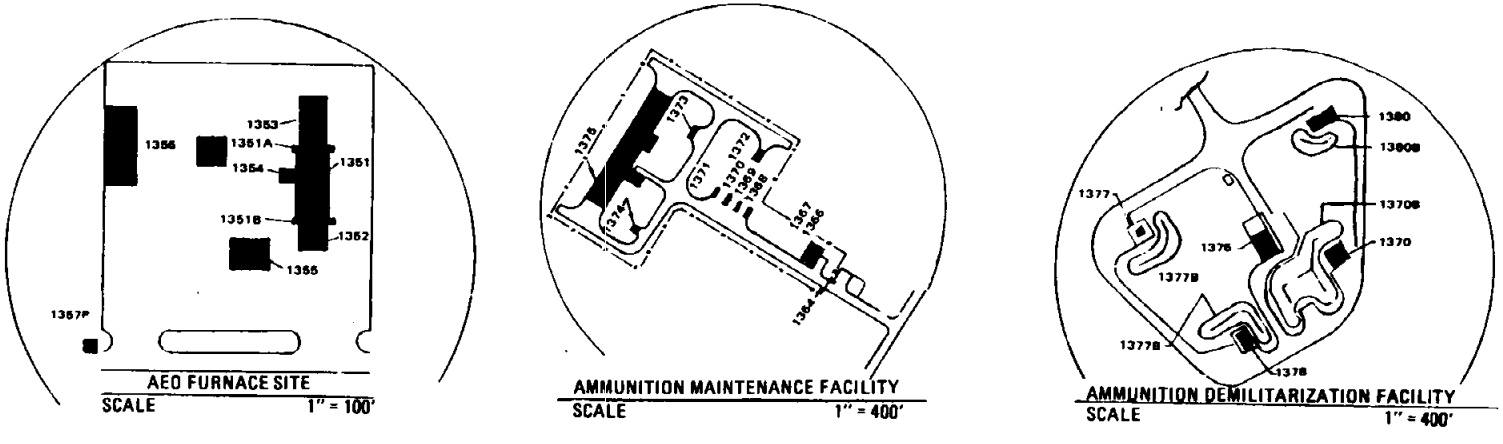

Figure 11. Other Ammunition Activities Sites in TEAD North Area

The Ammunition Equipment Office (AEO) conducts tests on the demolition grounds, the AEO Deactivation Furnace Site (location 6, Figure 7), AEO Demilitarization Facility (location 7, Figure 7), and Chemical Range (location 4, Figure 7). These tests are to assist in the design, development, and manufacture of ammunition peculiar equipment and processes. Conventional ammunition and bulk explosives are utilized to test suppressive shielding, deactivation furnace limits and operations, propagation distances, demilitarization operations, and ammunition handling.

(2) South Area

Surveillance testing in the South Area was conducted around Buildings T-3250 and T-3251 (location 10, Figure 8) until the early 1970's. These tests utilized a 9-meter drop tower for testing thermate bombs and a pendulum functioning facility for testing M69 and M79 bombs from the M19 cluster bomb. The M69 was napalm-filled and the M79 was filled with an incendiary mix. The M69 employed a WP cup to ignite the napalm; some WP may still be in the area.

Smoke pots, M15 WP grenades, and smoke grenades were tested approximately 137 meters north of Building T-3250 and also in front of Building T-3251. There is a possibility that there may be some WP contamination in this area also.

During the late 1960's, surveillance testing of cyanogen chloride (CK) and phosgene (CG) filled bombs was done in Former Storage Area 2. This testing involved sampling the CK agent-fill and sending the samples to the Chemical Laboratory, Building 541, South Area, for analysis. The CG-filled bombs were usually checked for leaks only.

The surveillance testing done in the South Area now is visual inspection and monitoring, with the M8 Chemical Detector Alarm and the M18 Detector Kit of the toxic agent-filled containers and munitions stored in Areas 2, 9, and 10 (Figure 8). These areas contain H, G, and VX agents and are monitored weekly, except in the case of igloos containing known leakers, which are monitored three times a week.

No tests involving chemical agent-filled rounds were reported, but tests utilizing WP, smoke, riot-control agents, and incendiary-filled munitions have been conducted by the AEO.

All malfunctioned munitions are recovered or destroyed in place; all residual metals, after certification, are sent to the Property Disposal Office (PDO) for salvage, and all explosives or other hazardous materials are either destroyed in the AEO Deactivation Furnace or sent to the Demolition Grounds for disposal.

e. Training

Training of reserve components is conducted primarily in the North Area of TEAD. One unit, the 659th Engineer Company, has been doing road construction and repair in the South Area. The units are from the Army National Guard, Army Reserve, and Navy Construction Battalions and are all support or service units.

Training is conducted in the shops, storage, and ammunition storage and service areas, and is under direction of personnel normally employed in these areas. The training involves the handling, storage, and repair of ammunition, ammunition-handling equipment, and other equipment serviced and stored at the installation, as well as road building and maintenance.

Familiarization with demolition techniques and demolition area operations is conducted in the North Area Demolition Area for those units involved in this type of operation. This training is closely supervised by the TEAD's demolition personnel.

Classrooms, billeting, and mess facilities are maintained in the TEAD Reserve Center Complex in the North Area.

Two rifle ranges are located on TEAD; one in the North Area and one in the South Area. The National Guard, Army Reserve, and Navy Construction units, as well as the troops stationed at TEAD, use the one in the North Area. This range is used for familiarization, qualification, and proficiency firing of small arms only.

The rifle range in the South Area is not used. No record was found as to when firing on this range ceased. It is believed that only small arms were used here.

Two buildings at TEAD have been used for training of civilian personnel in protective mask usage and checkout. Building S-107 is the Gas Mask Test Area in the North Area and only riot control agents in very small quantities are used. These are CN, CS, CS1, and CS2. After use, the building is decontaminated by ventilation, Hypochlorite flush, and water rinse. Building S-118 (location 11, Figure 8) in the South Area has not been used for gas mask training since 1976. Prior use involved CS.

f. Chemical/Biological/Radiological Activities

There is no evidence of biological agents/simulants or radiological agents having been handled or stored at TEAD. In contrast, many of the presently known chemical agents and mustard simulant MR (molasses residuum) have been stored and/or decontaminated at the North and South Areas of TEAD. Munitions containing mustard agent and WP were stored throughout

most of the North Area at one time. Areas identified as past storage areas include igloo areas J, K, G, C, and the open revetment area east of the igloos. The last of these munitions containing mustard agent were moved to the South Area in 1977. The South Area has traditionally served as the site for chemical agent destruction and burial. The new CAMDS facility is also located in the South Area of TEAD. CAMDS has been designed to demilitarize all specified toxic chemical items in storage, including rockets, landmines, bombs, mortar shells, projectiles, spray tanks, and ton containers. Demilitarization includes neutralization of nerve agents, deactivation of explosives/propellants, and incineration of metal parts.[6]

Small quantities of sealed radioactive materials have been used at TEAD in the calibration of equipment, industrial radiography, liquid level detectors, static eliminator brushes, etc. TEAD also has been authorized to receive, store, and repair ship gauges, watches, compasses, etc., containing minute quantities of radioactive materials. Isotopes handled at TEAD under existing authorization include iridium 192 and cobalt 60 (U. S. Nuclear Regulatory Commission License No. 43-14070-01), nickel 63 (USNRC License No. 43-14070-02) and carbon 14 and polonium 210 (Department of Army Authorization No. A43-23-01). In past years, the use of cesium 137, hydrogen 3, nickel 63, carbon 14, and promethium 147 had been covered by Authorization No. A43-20-20 (expired 30 August 1978). Krypton 85, plutonium 239, and radium 226 have also been on the installation.

Defective watch faces, having luminous radium-activated paint, were formally replaced in the watch repair shop (Building 605). These activities produced minor contamination of the facility with radium but the radium contamination was subsequently reduced to an acceptable level by mechanical scrubbing with wet towels.[7]

According to an AEHA survey,[8] waste radioactive tubes from the repair of electronics have been stored at TEAD. In 1969, four steel 208-liter drums containing radioactive tubes were accumulated in the fenced Radioactive Waste Storage Yard, located approximately 274 meters northeast of Building S-753 (location 8, Figure 7) in the North Area. As with all radiological waste disposal, the material was packaged and shipped (per instructions from higher headquarters) to an approved disposal site.

g. Storage of Toxic/Hazardous Materials

Storage of toxic and hazardous materials has existed at TEAD since 1942, in both the North and South Areas.

H-filled 4.2-inch projectiles were stored in J Area of the North Area until the early 1970's, when they were moved to K and G Areas. They remained there until the mid-1970's, when they were moved to C Area. All of the rounds were moved to the South Area in 1977.

H- and HD-filled landmines were also stored in J Area of the North Area in both igloos and open revetments. In the early 1950's, they were shipped to Dugway Proving Ground for demolition.

Radioactive materials have been used or stored in the following buildings:

(1) TEAD Dispensary - Medical and dental X-ray rooms, medical and dental X-ray units.

(2) Conventional Fire Control Service, Armament Branch, Building 605 - Watch Repair Shop, until mid-1960's. The source was luminous radium-activated paints on watch faces. No contamination existed in this area as of September 1969, based on wipe tests and radiological survey measurements.

(3) Ammunition Radiographic Facility, Building 554 (South Area) - Industrial X-ray unit.

(4) Ammunition Radiographic Facility, Building TL-21 - Industrial X-ray unit.

(5) Radioactive Materials Storage Area, Building MR554 - Radioactive luminous compounds (i.e., dials, printers, indicators, etc.). This building was located west of Warehouse Building 630.

(6) Radioactive Materials Storage Area, Building 605 - Radioactive luminous compounds (tank azimuth indicators).

(7) Radioactive Material Storage Area, Building 637 - Radioactive luminous compounds (gauges, etc.).

(8) Ammunition Storage Igloo, Building A 306 - Cobalt 60, radioactive source set, M-3.

(9) TEAD Headquarters, Building T-1 Vault - MX 10838/ PDR-27 Radioactive Test Samples, Radium 226.

(10) Safety Office, Building T-404, MX10838/PDR-27 Radioactive Test Samples, Radium 226.

(11) Radioactive Waste Storage Area, 274 meters northwest of Building S-753 - Conex Container for temporary storage of radioactive waste, speedometers, radioactive tubes, watch repair parts, tools, decontamination equipment and materials, cabinets, drawers, and shelves.

(12) Storage Tanks 901 and 902 - Conex Containers, lensatic compasses (tritium gas).

(13) Radioactive Storage Warehouse, Building S-659 - Compasses, sights, rangefinders, radioactive luminous compounds.

The following are stored in the North Area at the present time: high explosive-filled projectiles, rocket heads, landmines, fuzes, bursters, boosters, rocket motors, propellants, primers, detonators, delays, grenades, WP-filled projectiles, riot control agent-filled grenades and projectiles, smoke pots, smoke grenades, bulk explosives, demolition charges, bombs, pouch and document destroyers, etc.

The South Area has been used since the early 1940's for storage, service, and renovation of all types of chemical-filled munitions. These included munitions filled with H and G agents, VX, CK, CG, L, AC, CN, CN-DM, DM, CS1, CS2, WP, napalm, octal, thermate, and various other incendiary mixes, FS smoke, and MR (simulant).

At present, Areas 2, 9, and 10 in the South Area contain H, G, and VX in containers and munitions, and CAITS, M72, and M1 War Gas Identification Sets.

It was reported that leakage of munitions occurred during their storage in the South Area. These areas were decontaminated and the leaking munitions (reported as H) were disposed of by burning. No records of leaker locations and method of decontamination were found. However, one fenced area, located approximately 900 meters southwest of Area 2, was reported to have contained leaking H-filled munitions and signs indicating Toxic Chemicals were posted on the fence.

There is no indication that biological or radiological munitions have been stored in the South Area.

Appendix E is a list of buildings containing hazardous materials and their contents.

h. Pesticide, Herbicide, and Fertilizer Usage

Pesticides, herbicides, and fertilizers are used throughout the installation by trained Army employees. Fertilizers, such as ammonium sulfate (21 percent) are used around the administrative areas and the 10 family housing units. Herbicides, such as Hyvarx bromacil and 2,4-D, are used each year along railroad beds to improve visibility, and where plants are unsightly or present a fire hazard. There has been no herbicide disposal in the history of TEAD. A complete list of herbicides used is provided as Appendix F. Pesticides are also used every year throughout the installation. Lindane is used against the elm bore, warfarin is used for roach control, and a number of other pesticides are used against rats, mice, pocket gophers, rabbits, and insects. Pesticides used last year are listed on Table III.

Table III. 1977 Pesticide Usage

Pesticides	Amounts
Malathion 57%	95 liters - 2.3 kilograms per liter
Ficam Powder 76%	964 grams
Aerosol Pyrethiums 6%	340-gram cans, 96 cans
Diazinon 47.5%	7.6 liters - 1.8 kilograms per liter
Dursban 4E 41.2%	7.6 liters - 1.8 kilograms per liter
Superior Sprayoil 98.2%	76 liters
Rodenticide Bait 0.025%	36 kilograms
Chlordane 73.6%	38 liters - 3.6 kilograms per liter
Grain Bait Gophers 0.2%	45 kilograms
Krovar 40% bromacil 40% diuron	907 kilograms
2,4-D 44.9%	208 liters - 1.8 kilograms per liter
Bromeil 80%	476 kilograms

DDT was used until prohibited, and no DDT or any other pesticide has ever been disposed of on the installation. A list of pesticide requirements and usage is provided in Appendix G. Although the usage of pesticides and herbicides is heavy on TEAD, the use presents little environmental hazard and there have been no animal kills. There is no free-flowing surface water to be contaminated. In addition, the entire installation is located in a basin and drains inward, leaving little possibility for contaminants to migrate off the installation via surface routes.

Pesticides, herbicides, and fertilizers are stored behind three locked doors in Building 518 (location 9, Figure 7). Only three Army employees have access to these chemicals. The building was erected over concrete pad, and the chemical storage room is equipped with a large ventilating fan. As a result of cracks in the concrete flooring as well as spaces between the flooring and the walls, a new fiberglass floor is scheduled for installation. A complete list of pesticides and herbicides currently being stored in Building 518 is included in Appendix H.

2. Disposal Operations

a. Sewage Treatment

(1) In the North Area, domestic waste waters originating in ammunition storage and munitions renovation areas and at some guardhouses are treated in 11 small septic tanks and subsequently discharged to tile drainage fields. Domestic waste waters from housing, warehouse, maintenance, and administrative areas are collected in a separate sewer and treated by discharge to a sewage lagoon. A second lagoon is connected in series with the first lagoon to catch overflow; however, it has never been used. It was estimated that inflow to the lagoon is approximately 189,250 liters per day. Water is discharged from the lagoon via evaporation and percolation into the ground.

(2) In the South Area, domestic waste waters from administrative and housing areas are collected separately in a sanitary sewer that discharges to an Imhoff tank. Effluent from the tank is discharged to ditches which have a dense cover of vegetation. Domestic waste waters originating in remote locations are treated onsite via septic tanks and subsequent drainage through tile drainage fields. There were no indications of problems associated with treatment of domestic waste waters.

b. Burials

(1) Sanitary Landfill

Sanitary landfills are operated in both North and South Areas of TEAD. The North Area sanitary fill is located in a well-defined area at the south end of the open revetment storage area (Figure 7). This is the only fill area known to have been operated as a formal sanitary fill in the North Area. In addition to the conventional sanitary wastes put there, it has also been used for the disposal of untreated paint sludges (zinc chromate primer used), grease and oil, and paper-type filters (approximately 30 per year throughout the life of TEAD) used to filter PCB oil for reuse in transformers. It was estimated that each filter contained approximately 0.5 liter of PCB oil. Heavy metals from plating and other metal treatment operations were also disposed of in this landfill.

Other sites in the North Area have been used for disposal of wastes such as building rubble, garbage, rubber tires, etc. Nothing identified in these sites is considered to be hazardous.

The South Area has several sanitary landfills that were operated prior to 1976, the opening date for the present landfill. All of these fills are located along the south boundary of the present shops and warehouse area and west of the present site (location 12, Figure 8). No noxious or hazardous materials were identified as having been dispersed of in these areas.

The combined fill for the North and South Area active landfills averaged approximately 4,800 cubic meters per month from September 1977 through November 1978. At least 0.6 meter of compacted earth is applied to completed areas each 6 months. The solid waste is not compacted before covering. According to a compliance survey of federal activities, there are no National Pollutant Discharge Elimination System (NPDES), state, or local standards applicable to the land disposal sites.[9]

(2) Contaminated Waste

In addition to items noted in Section III.2.d below, chemical agent Identification Kits were reported buried in the South Area Demolition Grounds circa 1949 or 1950.

Another pit (location 2, Figure 8) contains cans and 208 liter drums. Several cans are marked "Decontaminating Agent, Non-corrosive"; however, no markings were visible on the majority of cans and drums in this pit. An interviewee stated that he had heard from "old timers" that this pit contains "a little bit of everything" and that people had been warned not to go into it. This pit is not fenced or marked with warning signs.

c. Holding Ponds

Waste waters associated with various industrial operations have been disposed of in lined and unlined holding ponds in the North and South Areas. Building L-23, the former North Area Redeye Missile Rebuild Facility, has a 4-mil polyethylene plastic-lined holding/evaporation pond on its north side that is currently used for the disposal of X-ray developer and rinse water. Building S-45, in the North Area Ammunition Workshop area (location 10, Figure 7), has several associated ponding areas. Immediately north of Building S-45 is a baffled cement settling tank fed by a metal gutter. This tank received waste water generated during the washout of munitions containing TNT, Composition B, and tritonol. Overflow from this tank entered the first of four unlined percolation/evaporation ponds connected in series by overflow pipes. Washout operations were in progress during 1948 through 1958 and again during 1960 through 1965. Directly east of the fourth pond is a shallow pond that was used for disposal of laundry (Building 67) and shower waste waters containing small quantities of the above exposives. A shallow scooped-out area covered with gravel is located east of Building 1303 where HE bombs (TNT) weighing 113 to 136 kilograms were cut. Dust was vacuumed and the structure (tin shed/cement floor) was washed down weekly; the waste water drained across the road to the ponding area.

During the late 1940's, a gravel-lined pond located near the north end of H Road (North Area Industrial Area) was reportedly used for industrial waste water.

In the South Area, an unlined drainage pond located east of Building 600 received that building's waste water. Building 600 was used as an HE cluster bomb washout building in the late 1940's and early 1950's. Mustard projectiles, WP, and HC smoke pots have also been renovated in this building.

d. Demolition and Burning Ground Areas

The Demolition and Burning Grounds, in the North Area, are located in the extreme western part of TEAD. The following activities have been conducted here since TEAD's opening in 1942: demolition of explosives; burning of explosives, explosive-contaminated materials, and riot-control agents and munitions; and the disposal of WP-filled munitions through demolition and/or burning.

Explosive demolitions are conducted in a large area, against a ridge several hundred feet high. Large pits are dug, from 12 to 15 meters deep; the materials to be destroyed are placed in them, up to 6,804 kilograms per shot; and the pits are closed with earth and detonated. After detonation, the area is searched for unexploded ordnance (UXO); if any are found, they are destroyed in place. All types of conventional ammunition are destroyed here, from small arms up to 12,000-pound bombs, including propellants and rocket motors.

On the east side of the ridge, against which the demolition pits are dug, is the WP Demolition Area. The WP munitions are placed in rows on the ground. A charge is placed on each munition and then detonated, opening the round and allowing the WP to burn out.

Bulk explosives, explosive-filled munitions, explosive-contaminated materials, smoke pots and grenades, bulk WP, and CS riot-control agent munitions, as well as dunnage, packing materials, and containers, are burned in pits.

All metals recovered from these demolition and burning operations are reburned to insure the removal of residual contamination. When certified clean, the metals are sent to the PDO for salvage.

Meteorological conditions are monitored and any meteorological condition that could create an environmental hazard to the surrounding area or its inhabitants is cause for cancellation of the operation until more favorable meteorological conditions exist.

The Demolition Area in the South Area has been used for the disposal of various types of chemical agents and munitions since the mid-1940's. Disposal was accomplished either by burning, or in the case of CK and CG-filled items, released into the atmosphere.

Those items to be destroyed by burning were transported to the burn site within the Demolition Area, placed on piles of dunnage, and the pile ignited. The function of the heat was to rupture the items and expose the fill to the flames for thermal decomposition. After cooling, the scrap was taken to a pit and buried.

In the late 1950's, items containing CK and CG were taken to the Demolition Area where the filling plugs were removed and the agent allowed to dissipate into the atmosphere. When empty, the containers were burned, put into a pit, and buried.

In 1978, the last of the stored Agent AC was incinerated and the containers were decontaminated by rinsing with the caustic solution. The Demolition Area contains 27 documented covered pits, surrounded by a fence (location 3, Figure 8), where the following were buried: M70 mustard bombs, M4A2 smoke pots, WP grenades, trash, thermite, M20 bomb clusters, M50XA3 bombs (thermate), one German Tabun bomb, M47 mustard bombs, boosters, and "Poison Gas" (probably mustard). It is also purported that mustard was disposed of in this general area without burning. Table IV is a list of these pits and their contents.

This information is based on Disposition Form (DF), subject: Buried Hazardous Material, to the Commanding Office, TEAD, dated 1 April 1959. (It should be noted that information in this document is based on interviews taken at that time.) Figure 12 is a map indicating the pit locations. Also indicated on the map are two mustard-holding areas where leakers were stored prior to destruction and two nearby pits where H is thought to have been burned. The above DF notes a covered pit, known as the "Gravel Pit" (location 4, Figure 8), just south of Storage Area 10 that is said to contain M2 ignition cartridges, squibs, hand grenades, blasting caps, and M21 incendiary bomb clusters. In addition, this area possibly contains smoke pots, TNT blocks, M74 incendiary bombs, FS smoke (in bottles), and M19 incendiary bombs. Interviewees also stated that mustard may have been buried at this site. The contents of this pit were not demilitarized prior to burial.

Six signs at this location read "Buried Bombs - Keep Out" and two read "Danger - Pit Contaminated with Toxic Chemical Munitions."

The above mentioned DF also notes a ".... pit, known to have been used for demilitarizing purposes, is believed to be now empty of hazardous material. It is located directly beneath the present location of Warehouse No. C4002" (location 5, Figure 8). This is the location of a large explosion (4.2-inch high explosive shells) which occurred in the late 1940's. After the resulting explosion, the crater was filled in, and all contents assumed demilitarized by the effects of the explosion." The nature of materials demilitarized at this site is not known.

Table IV. Contents of Covered Pits Within the Demilitarization Area, TEAD South Area (Figure 12)

Pit Number	Contents
1a	M70 Mustard Bombs
1b	Mustard Bombs, M4A2 Smoke Pots, White Phosphorus grenades, trash
2	Thermite
3	Smoke Pots
4	M20 Bomb Clusters
5	Smoke Pots
6	Smoke Pots
7	Smoke Pots
8	M50XA3 Bombs
9	Smoke Pots
10	Thermite
11	Smoke Pots
12	Smoke Pots
13	M70 Mustard Bombs, one German Tabun Gas Bomb
14	M70 Mustard Bombs
15	M70 Mustard Bombs
16	M70 Mustard Bombs
17	M50XA3 Bombs
18	M50XA3 Bombs
19	M50XA3 Bombs

Table IV. Contents of Covered Pits Within the Demilitarization Area, TEAD South Area (Figure 12) - Continued

Pit Number	Contents
20	M50XA3 Bombs
21	M50XA3 Bombs
22	M70 Mustard and M47 Bombs
23	M70 Mustard Bombs
24	Trash Pit
25	Boosters
26	"Poison Gas" (probably mustard)

There are also several other open pits within the Demolition Area containing artillery and mortar projectiles, cans, and 55-gallon drums. A cursory inspection of some of the projectiles, cans, and drums revealed that they were empty; however, the pits were not covered.

The 4.2 inch mortar pit (Figure 12) contains approximately 59,000 empty projectiles. These projectiles had been originally open pit burned sometime prior to 1954 in 15 other pits within the Demolition Area. These pits were formerly designated as pits 31 through 45; but are no longer identified. The 4.2 inch projectiles were transferred to their current location circa 1971. A 1972 study[10] stated "...some are possibly contaminated with H." The source pits, after removal of the projectiles, were reportedly treated with hypochlorite based decontamination powder, the source of the empty 55-gallon drums.

The contents and locations of former pits 27 through 30 are unknown.

Two other long piles of scrap metal, known as the Windrows, were located within the HE Demolition Area (location 6, Figure 8). These were found to contain cluster bars, hangers, nose plates, tail sections of cluster bombs, and fire bomb casings with M50-type thermate bombs all through the piles. Most of these M50 bombs have been inerted, but many still have live explosive X charges in them.[11]

Several burning pits for dunnage were located on the present site of the CAMDS Facility. The only material disposed of in this area was dunnage, strapping, etc. No contaminated material was disposed of in this area.

e. Demilitarization

Demilitarization operations have been conducted in both the North and South Areas.

In the North Area, demilitarization has taken place in the Ammunition Workshop Area, the Ammunition Maintenance Facility, the Ammunition Equipment Office Furnace Site, the Deactivation Furnace, Building 1320, and the TV Range. *

Building S-45 in the Ammunition Workshop Area was used for explosives washout operations until the mid-1960's. An older building, T-45, was originally on this site and was used for the same operation. It was burned and the metal from the building was certified 5X clean and sent to PDO for salvage. Building S-45 was erected on the site using the same foundation. Items washed out in these buildings include projectiles, bombs, and rocket heads filled with TNT, Composition B, RDX, and tritonal. Also conducted in this building was the removal, pelletizing, and bagging of propellant. All washout and bagged materials were either sold or destroyed in the Demolition Area. All metal parts were flashed either in the Flashing Furnace or burned in the Demolition Area, and after certification as clean, were sent to PDO for salvage.

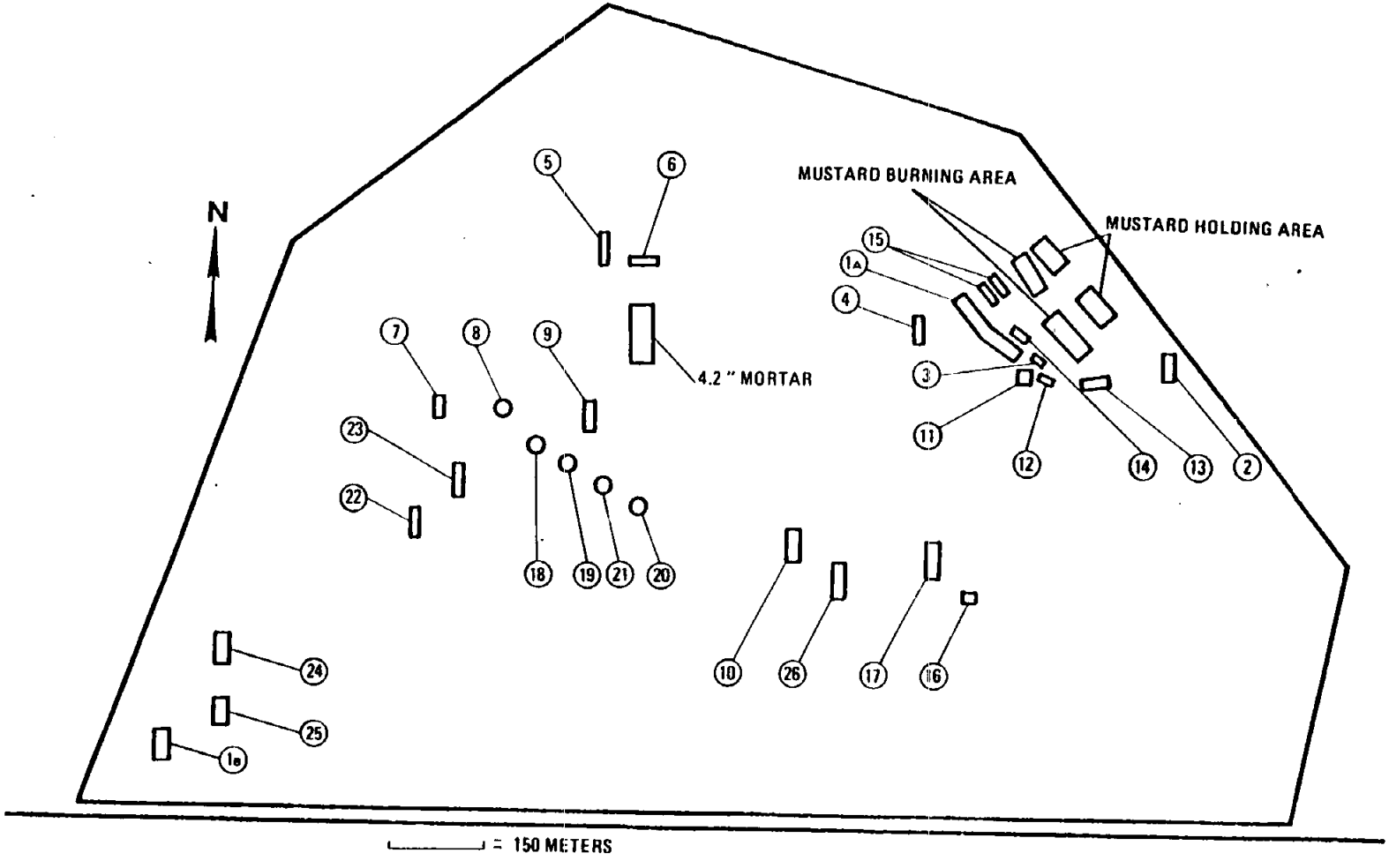

Figure 12. Burial Sites in the Demilitarization Area in TEAD South Area

Removal of base plates from bombs was performed in a barricade outside of Building S-31 until the mid-1960's.

Disassembly, powder removal, and decoring of small arms ammunition was done in Building 520 until the early 1960's.

Destruction of primers, tracers, and incendiary powders from small arms demilitarization operations was conducted in the Deactivation Furnace in Building 539 until the early 1960's. An experimental furnace was erected in the area adjacent to Building 539 to burn artillery and bomb fuses, primers, and small arms ammunition and was used until the late 1950's. All residual materials, after certification as clean, were sent to PDO for salvage.

Building 1303, on the TV Range, was used from 1960 to 1976 to saw HE bombs and projectiles apart in order to determine loading characteristics of the filling. Dust from the sawing operations was collected by a vacuum cleaner directly under the saw. The material collected by the vacuum cleaner was sent to the Demolition Grounds for disposal. The building was washed down at frequent intervals and the water went into a leaching pond east of the building.

Demilitarization operations conducted in the AEO Demilitarization Facility are experimental or pilot plant type operations to determine if the operation is feasible and if any special techniques or equipment are needed to facilitate the operation. Once the equipment is designed and assembled, it is tested in this facility. Live ammunition (TNT, Composition B, tritonal, propellants) is generally used in the test of the equipment. After the test, the area is policed and cleaned and the recovered materials are taken to the Demolition Grounds or Deactivation Furnace for disposal.

The Deactivation Furnace, Building 1351, and the Flashing Furnace, Building 1356, are in the Ammunition Equipment Office Furnace Site. The Deactivation Furnace is used for the destruction of HE-filled projectiles (up to 155mm), propellants, grenades, boosters, fuzes, and bulk explosives. In 1978, a few 3.5-inch WP rockets were burned. Also, 500-pound HCN bombs have been destroyed here; the last ones in 1978. Under a formal demilitarization program directed by USATHAMA, the bombs were vented into the furnace, and the HCN was burned. The vented casings were flushed with alkaline solution to destroy the residual HCM. The salts (approximately 18.1 kilograms) from the demilitarization of the vented bomb casings were buried in the landfill. The Flashing Furnace is used to "flash" washed-out munition casings. All metals, after certification as clean, are sent to PDO for salvage. The material (explosives residue and metal oxides) from the "baghouse" filters is taken to the Demolition Grounds for disposal by burning.

The Deactivation Furnace, Building 1320, is utilized for the destruction of small arms ammunition, primers, and fuzes. Metals, after certification as clean, are taken to PDO for salvage. Residues and wastes from this furnace are disposed of by burning at the Demolition Ground.

Some experimental work was done in the area of Building 1304, using microwave for the removal of explosive filler as an alternative to washout operations. A tin shed lean-to, near Building 1304, was destroyed when a 105mm, TNT-filled projectile used in the test operation exploded. The operation was attempted with a 750-pound tritonal-filled bomb and was successful. The explosive filler from the bomb was taken to the Demolition Grounds for disposal. The operation was briefly transferred to Building 1309 in 1975; this building burned the same year. All debris from a tin shed lean-to, which was destroyed when the 105mm projectile exploded, and debris from Building 1304 were flashed and certified clean, and salvageable material was sent to PDO for disposal.

A Deactivation Furnace (Building 1344) was operated briefly during 1975 for destruction of small arms ammunition. The residual material was certified clean and sent to PDO for salvage. Operations in the furnace stopped in 1975 due to the construction of a rifle range in this area. Waste from this operation was not collected; it was allowed to scatter in the surrounding area.

Demilitarization operations were conducted in the South Area in Building 554 and Building 520 (location 1, Figure 8). Building 554 was used for incendiary washout operations until the late 1950's. Items demilitarized here were M14, M17, and M17A1 incendiary bombs; the operation involved removing tail assembly, shearing the firing pin, and washing out the first-fire and thermate mix from the M50-type bombs. The settling ponds were drained and the residual material was taken to the Demolition Area, burned, and buried. The residual bomb and cluster parts were taken to the Demolition Area and piled in windrows approximately 300 to 400 meters long by 20 to 30 meters wide. Some of the M50-type bombs containing explosive X charges were buried in pits. These are identified in the enclosure under Demolition and Burning Ground Areas.

A Deactivation Furnace is located in Building 520 for the disposal of fuzes, first-fire mixes, primers, and small arms. In June 1976, experimental disposal tests were conducted on CS-filled M25 riot-grenades, M674 projectile (40mm), and the M158 Tactical Cannister. The tests were not successful and the operations were aborted. The residual material was decontaminated and, upon 5X certification, sent to PDO for salvage.

A major demilitarization facility, the Chemical Agent Munition Disposal System (CAMDS) has been constructed in the South Area. CAMDS is a prototype complex designed to demilitarize a wide variety of chemical munitions and containers and detoxify chemical agents GB, VX, and mustard. The system has been undergoing preproduction testing and is scheduled to become operational in late FY79. The CAMDS operations are designed

to operate with no significant environmental impact. All liquid waste solutions are to be dried via a drum dryer and the dried solids stored in sealed fiber drums.

f. Miscellaneous

(1) In 1976, as a result of a utility pole fire west of Igloo K281, North Area, a transformer dropped and spilled its oil. It is not known whether this transformer contained PCB.

(2) Extensive ground contamination by H due to leakage from bombs took place in the Mustard Holding Area in the Demolition Area and in the southwest portion of Former Storage Area 2, both in the South Area (Figure 8). The latter was decontaminated by treating with bleach and plowing the ground. However, this area must be considered contaminated. Although this area is fenced off and marked as contaminated, the fence is in a poor state of repair, some signs have fallen down, and others are not legible.

(3) Another holding area just north of the Demolition Grounds (location 8, Figure 8) is fenced off and marked as contaminated; however, signs are illegible.

(4) In January 1978, a fuel oil spill of approximately 1,893 liters occurred at the CAMDS site. It was cleaned up in accordance with TEAD's Spill Prevention Control and Counter-Measure and Installation Spill Contingency Plan by absorbing the oil on sand and then removing the sand to the Demolition Grounds where the oil was burned off. No documentation was found reporting any other oil spills.

VX is said to have leaked from a ton container at the impounding bay in the southeast corner of Former Storage Area 2 in the South Area (location 9, Figure 8).

B. Water Quality

1. Surface

There are no year-round natural lakes or surface streams on either area of TEAD. The only natural surface waters are storm and snow runoff and intermittent streams. Industrial waste waters containing heavy metals, oil and grease, industrial solvents, etc, are discharged to surface drainageways in the North Area industrial operations area via five outfalls. These waste waters flow northwest from the industrial area toward an open revetment area between igloo areas O and P. The waste waters spread out on the ground, evaporate or percolate into the ground, and leave behind surface residues of contaminants (especially the heavy metals chromium and cadmium). Soil analysis of the old conveyance channel yielded a chromium content greater than 360 milligrams/kilogram. With the ion exchange capacity of soil

estimated at 300 milligrams per liter, the analysis indicates that the local capacity for chromium has been reached.[12] The heavy metal residues are considered hazardous to wildlife and grazing livestock. Maximum concentrations of cadmium and chromium recommended for livestock are 0.05 and 1.0 milligram/liter, respectively. Per an AEHA study: "Aside from the hazard to wildlife and livestock, the spreading of these industrial wastes on the land surface is an acceptable practice."[5]

The South Area is crossed by Ophir Creek along its eastern edge. This stream flows intermittently and the water percolates into the ground within the boundaries of the installation.

NPDES permits are not required for either TEAD Area.

2. Subsurface

Groundwater is encountered at varying elevations in both the North and South Areas. Because of the semiarid climate, both the Rush Valley and Tooele Valley are dependent upon groundwater for domestic and irrigation water supplies. The Rush Valley is not heavily populated; however, most of the domestic wells in Tooele Valley are located directly north of the TEAD North Area. These wells receive groundwater after it has passed beneath TEAD. In the North Area, the perched groundwater above the clay layer is brackish and alkaline and is not utilized as a drinking water source.

a. North Area

Groundwater in Tooele Valley is considered hard, containing either calcium bicarbonate with a relatively small dissolved solids content, or sodium chloride with high dissolved solids content. Generally the water near the the mountains is calcium bicarbonate having been dissolved from limestone. As the water moves through the valley fill, sodium chloride is dissolved from the soils.

Water from the wells on TEAD contains 100 ppm to 600 ppm sodium chloride; good to fair quality. Long-term chemical analyses of water from the wells by USGS and USAEHA shows no unacceptable amounts of mineral matter or toxic substances. Recent USGS studies,[13] however, show an increase of sulfates and chlorides in Well 1 since 1957 on the order of 70 to 80 percent.* It is reportedly hypothesized that water may be infiltrating from a nearby mining operation. It should be noted that well water was not tested for all possible contaminants such as elemental phosphorus.

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* Analysis[13] of chloride (Cl^-) and Sulfate ($SO_4^=$) values from Well 1:

Year	Cl^-(mg/l)	$SO_4^=$(mg/l)
1957	135	210
1976	235	378

Recommended drinking water limit for both anions is 250 mg/l.

In the North Area, the sanitary landfill, industrial waste outfalls, ammunition plant washouts, and possibly other contaminant areas are located in permeable soils. The WP demolition pits and possibly the Chemical Range are located within the probable recharge area for the valley aquifers.

b. South Area

Groundwater in Rush Valley is hard but generally of good quality. USGS has found the quality of water in Wells 1 and 2 to vary significantly as to content of dissolved solids. It is hypothesized that a change in flow due to variations in recharge from Ophir Creek and withdrawal of well water accounts for varying water quality. Generally, though, well water is of good quality.

In the South Area, storage of leaking mustard bombs, burial of leakers, and HE demolition have been carried out above the channels of probable groundwater flow.

C. Migration Potential

The potential for contaminant migration exists on both the North and South Areas of TEAD. Of primary concern is the section of North Area groundwater recharge located at the southwest corner of the base within an area generally above the elevation 1,554 meter ground contour. This area includes the demolition pits and possibly a section of the Chemical Range. The pits appear to be located within a low area along Box Elder Wash. Thus, it would be possible for any residue from demolition or burial to enter the groundwater by percolation directly down through granular soils or perhaps as underflow beneath the Wash channel.

Other possible sources of pollution in the North Area could be the raw sewage lagoon, the landfill, ammunition workshop outfall, and the industrial drains. The geologic conditions in these areas are not as well defined as in the southwest corner of the North Area; however, seepage from these contaminant sites could infiltrate the upper perched water reportly encountered at depths of 6 meters. Flow characteristics in this stratum are not known. The possibility of movement of contaminants from the shallow aquifers to the principal aquifers below is unlikely in large quantities due to the great separation in depth. The sources where water is present continually, such as the sewage lagoon and industrial outfalls, are more likely to be contributing contaminants to the groundwater than sources where precipitation may be the only water present. Another factor to consider would be the solubility of the contaminant; i.e., if it will leach out after penetrating the soils a few meters.

In the South Area, the major areas of contamination are the Former Mustard Storage Areas, burial areas, and Demolition Grounds. Significant amounts of water were found at shallow depths. In fact, HE-cratered demoli-

tion pits are deep enough to intercept groundwater. All facilities having a potential for possible groundwater contamination are reportedly located southeast of the predicted groundwater divide. The landfill was reportedly used for refuse only and the Imhoff tank has relatively low flow; thus, they are not considered as major contaminant sources.

Tooele Valley has a large population for a desert valley and most of its domestic water supply comes from wells drilled downstream of the North Area of TEAD; thus any contaminant leaving TEAD's boundaries would flow toward this high discharge area. To the south or downstream of the South Area there is apparently little usage of groundwater, at least before being discharged from the valley through the mountain passes to the east.

IV. FINDINGS

A. Geology

1. The groundwater recharge zone extends beneath the North Area Demolition Grounds.

2. The surface soil in the North Area is permeable sand, sand and gravel, and desert bench soil.

3. Groundwater flow in the Tooele Valley is toward the north and the Great Salt Lake. The uppermost groundwater flow, derived from surface percolation is encountered at 5.5 to 6.1 meters below the surface.

4. South Area groundwater flows through the northwest and drains to the north toward Rush Lake and through the south and east sections to the south and east through the Five and Ten Mile Passes.

B. Installation Operations

1. North Area

Industrial operations have generated waste waters containing heavy metals, POL, and cleaning wastes. The outfall flow percolates into the granular soil. Testing and disposal of HE, WP, and pyrotechnic material is a continuing operation at TEAD.

2. South Area

Primary functions have been the storage, maintenance, renovation, demilitarization, and disposal of incendiary and chemical agent material.

C. CBR Activities

In the North Area, mustard agent (H) was stored until 1977. Storage and disposal of WP and pyrotechnics continue. Repair of luminous devices has involved radium-activated paint (Building 605 in the North Area).

D. Water Quality

No permanent surface water system exists in either area. The North Area industrial outfall soil percolation zones yield analytical results for chromium at a level of 360 milligrams/kilogram. Well 1 (North Area) has increasing levels of Cl and SO_4 and the current concentrations equal or exceed drinking water standards.

E. Sanitary Landfills

1. North Area

This area reportedly contains plating wastes, PCB, and paint primer (zinc).

2. South Area

There are several areas used for disposal. No hazardous materials are reported to be incorporated.

F. Contaminated Waste Burial

1. North Area

There are none reported.

2. South Area

Several areas have been utilized for the disposal of contaminated wastes.

G. Holding Ponds

1. North Area

Holding ponds in this area contain:

a. X-ray developer and rinse water (lined).

b. Explosives washout (unlined).

c. Industrial waste water (gravel-lined).

2. South Area

Explosive washout and wastes from mustard munitions, WP, and HC smoke pots flow into an unlined drainage pond.

H. Demolition and Burning Ground

1. North Area

The demolition and burning ground is located in the southwestern section and is used for HE and HE contaminated items, pyrotechnics (Chemical Range), riot control agents, and WP. Facilities are available for demilitarization of small caliber ammunition (popping furnaces).

2. South Area

The Demolition Area/Disposal Pits were used for the disposal of chemical agents, munitions, and explosives. The majority of the pits are marked and the contents identified. However, four pits designated as 27 through 30 have not been located nor has past usage been determined.

I. Demilitarization*

1. North Area

Sites for demilitarization are:

a. Building S-45(I) - Ammunition Workshop and site of the former T-45 (NE) with the same function.

b. Building 520 (I) - Small Arms.

c. Building 539 (I) - Experimental popping furnace.

d. Building 1303 (I) - HE munition sawing.

e. Building 1351 (A) - Deactivation furnace.

f. Building 1356 (A) - Flashing furnace.

g. Building 1320 (A) - Deactivation furnace.

h. Building 1344 (NE) - Deactivation furnace.

2. South Area

Sites for demilitarization are:

a. Building 554 (I) - Thermate washout.

b. Demolition Area/Disposal Pits (I)

c. Building 520 (I) - Deactivation furnace.

d. CAMDS System (UC).

*(A) - Active, (I) - Inactive, (NE) - No longer exists, (UC) - under construction.

J. Miscellaneous

1. North Area

a. There was a transformer oil spill near Igloo K281.

2. South Area

a. There were H spills in the Mustard Holding Area in the Demolition Area, and Former Holding Area of Area 2.

b. There was a VX leak reported in the southeast corner of Area 2.

c. There was an oil spill in the CAMDS area.

V. CONCLUSIONS

A. A potential exists for contaminant migration via groundwater flow from both the North and South Areas.

1. The potential sources in the North Area are concluded to be the demolition grounds, which lie within the aquifer recharge zone of Tooele Valley, and the industrial waste outfall; the resultant accompanying infiltration is into the uppermost groundwater stratum.

2. The South Area migration potential is created by the shallow groundwater flow beneath the old Demilitarization Area/Disposal Pits along the south boundary.

3. The North Area is considered to have the greater potential for contaminant migration and impact on the groundwater quality. This is because of the higher population density downstream of the North Area, and the greater groundwater velocity as compared to the South Area.

B. The buried chemical munitions and contaminated soil in the South Area are a potential long term hazard. The lack of information on the location and contents of the former pits 27 through 30 would compromise any remedial measures planned for the elimination of the hazard.

C. As a result of the waste water discharge at the North Area industrial outfall, the soil has become contaminated by heavy metals from plating operations. Since there are no adequate restraints, grazing cattle entering the area to feed may ingest contaminated vegetation.

D. The increasing chloride and sulfate levels in North Area Well 1 are compromising its use as a source of potable water.

E. The leachate potential from the landfills and the composition of surface runoff from both areas cannot be characterized. This is due to lack of information, absence of NPDES permit requirements, and minimal requirements for landfill management.

F. The soil near igloo K281 may be contaminated with PCB's as a result of a transformer oil spill.

G. Because of the thin gage (4 mil) of the X-ray solution waste pond liner, the useful life of the pond is anticipated to be of limited duration.

VI. RECOMMENDATIONS

A. That PM CDIR (currently USATHAMA) conduct a preliminary survey in the North Area of TEAD and also pursue a program to firmly define the problem of buried chemical munitions and agent contaminated soil in the South Area.

B. That TEAD establish a program to locate and identify the contents of the former South Area demolition pits 27 through 30.

C. That TEAD impound the industrial wastewater in the North Area in a lined evaporation pond, and fence the area to prevent cattle intrusion.

D. That the data from North Area Well 1 be reviewed by the medical community to determine if the well should continue as a source of potable water.

E. That TEAD install monitor wells around the landfills to a depth of 10 meters and establish a sampling program for the surface drainage systems to provide the required characterization data.

F. That TEAD analyze soil samples from the site of the transformer oil spill to determine residual PCB.

G. If the X-ray pond is to be permanent, and the waste material is determined to be hazardous, the pond should be redesigned to include a liner which meets federal regulations for thickness. A catch sump or other suitable leachate detection system is also recommended.

LIST OF REFERENCES

1. TEAD Organizational History for Period 1 July 1975 through 30 September 1976.

2. DARCOM Installation and Activity Information Summary, DRCIS-102(R1).

3. TEAD Draft Environmental Impact Statement.

4. AMCMA-VS/3 message 241928Z Apr 1978/TEAD 2955, and AMCMA message 05202Z June 70/TEAD 4091.

5. Water Quality Geohydrologic Consultation No. 24-052-75/76, TEAD, Tooele Utah, 16-20 June 1975.

6. Stationary Air Pollution Source Assessment No. 21-1006-77, Metal Parts Furnace, Chemical Agents Disposal System, TEAD, Tooele, Utah, 8-9 July 1977, page 2.

7. USAEHA Report of Radiological Hygiene Survey No. 4824R22-65, X-Ray Facilities, TEAD, Utah, 4-9 November 1964, pages 2 and 3.

8. USAEHA Radiation Protection Survey No. 43-023-70, Ionizing Radiation Sources, TEAD, Tooele, Utah, 22-26 September 1969, page 5.

9. EPA Solid Waste Management Guidelines, Compliance Survey of Federal Activities, 26 May 1976.

10. Gahi, J.S. 3 LT CMLC, Memo to Chief Ammunition Division, TEAD Subject "Suggestions for Demolition and Burning Grounds TEAD South Area", 4 August 1972.

11. AEO Report 5-77, Study for TEAD South Area Thermate Bomb Residue Cleanup, March 1977.

12. Wentink, G.R. and J. E. Etzel, "Removal of Metal Ions by Soil", Journal WPCF, 44, No. 8, pages 1561-1574 (1972); referenced in "Waste Water Treatment and Reuse by Land Application, Volume II", EPA-660/2-73-006b, August 1973.

13. Unpublished Data from Mr. Allen Razem, Geologist, USGS, Salt Lake City, Utah.

14. USAEHA Report No. 43-073-73/74 "Evaluation of Lensatic Compass Storage" January 1974.

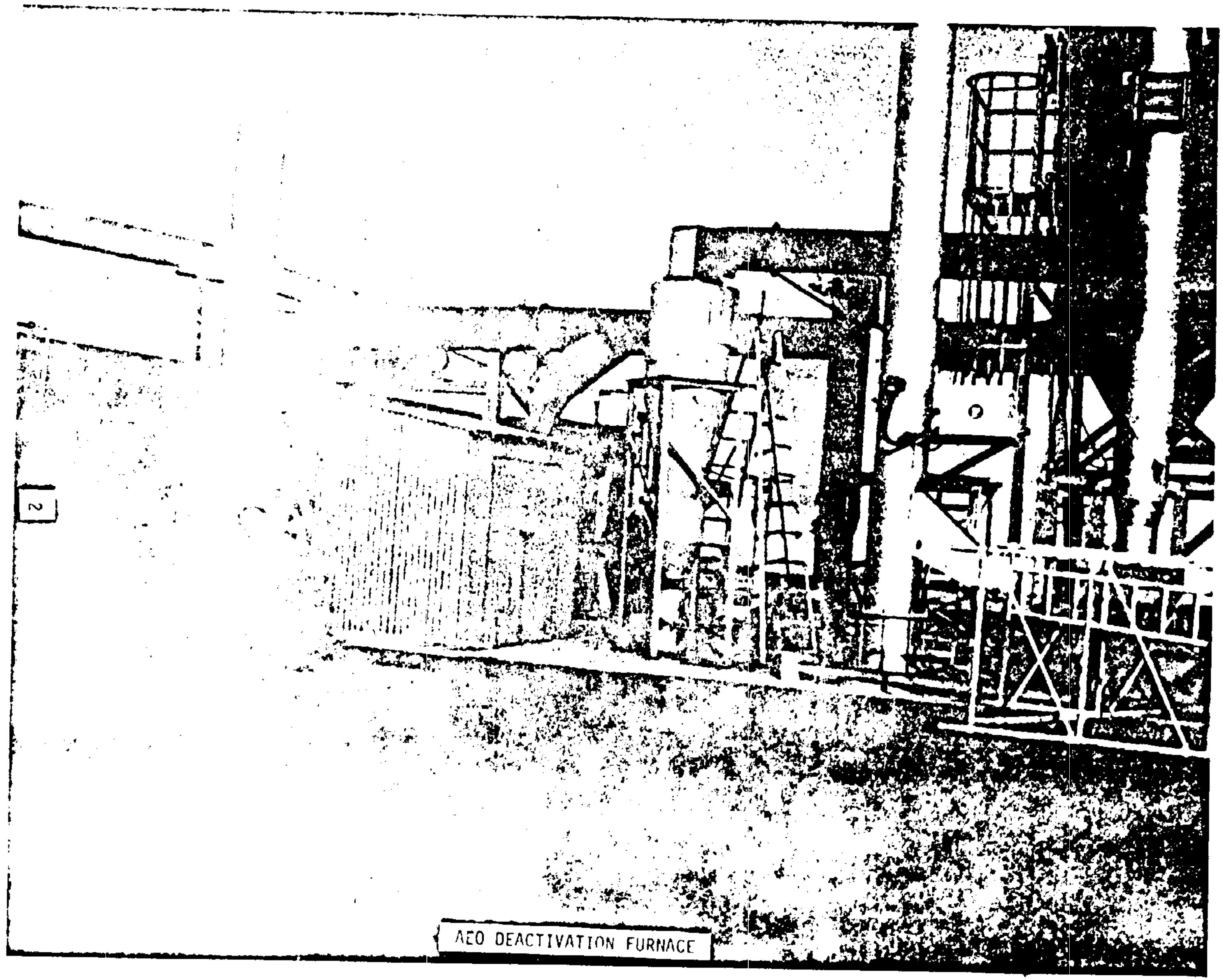
15. USAEHA Report No. 44-B08-75, "Pest Management Survey", January 1975.

16. USAEHA Report No. 24-013-75, "Waste Water Monitoring Program", April 1975.

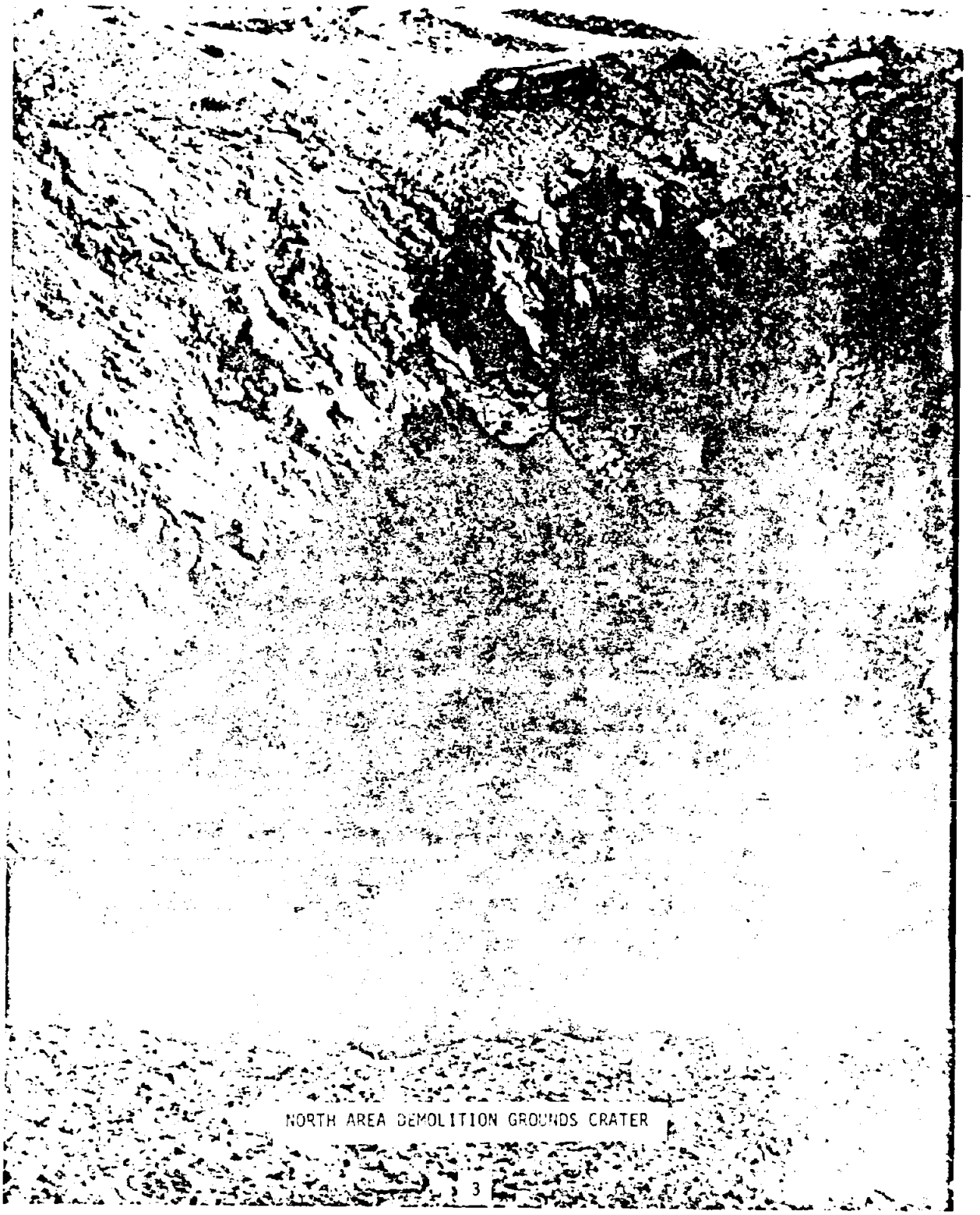
17. USAEHA Report No. 24-052-75/76, "Geohydrologic Consultation", February 1976.

APPENDIX A

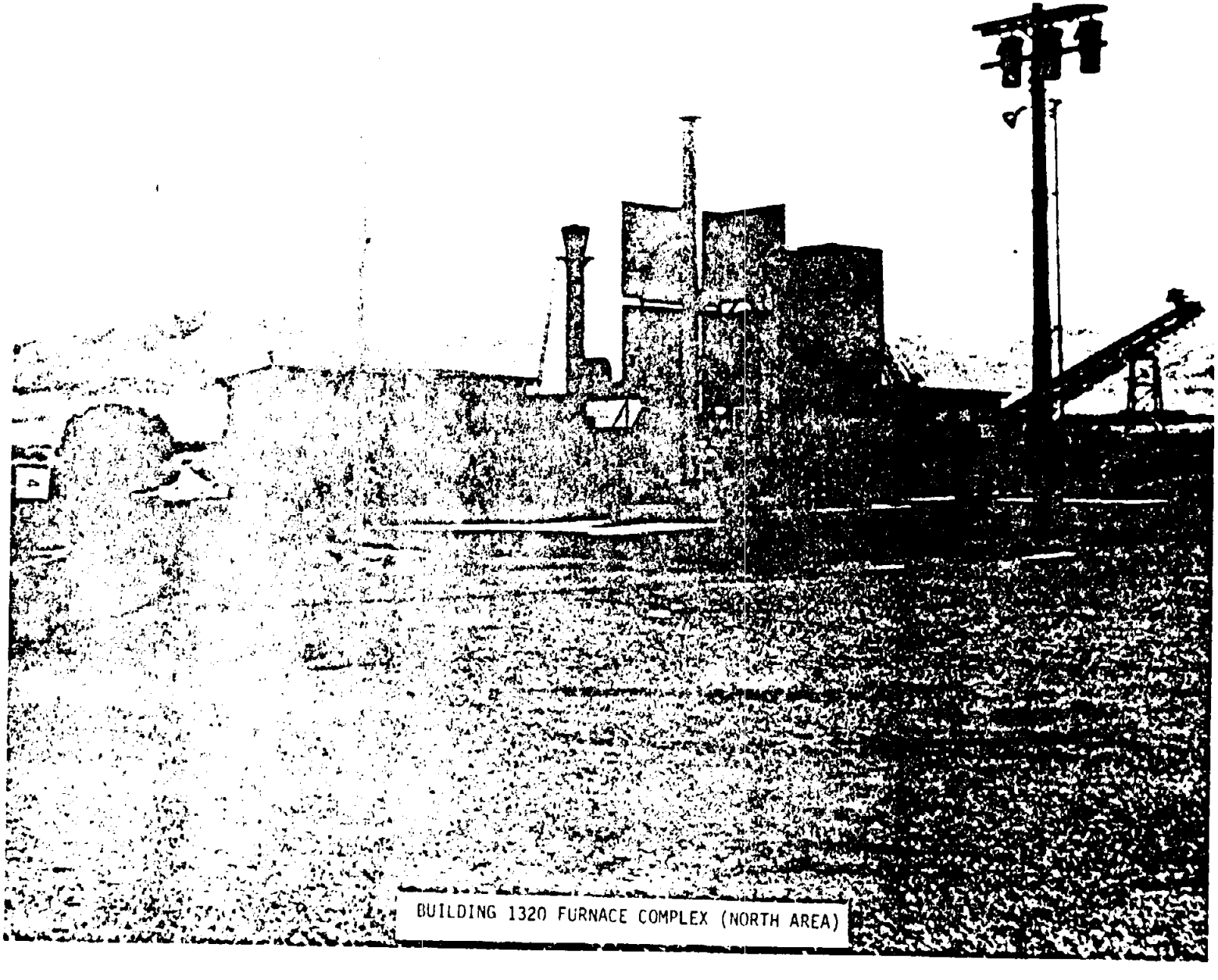
PHOTOGRAPHS OF TOOELE ARMY DEPOT



2
AEO DEACTIVATION FURNACE



NORTH AREA DEMOLITION GROUNDS CRATER



BUILDING 1320 FURNACE COMPLEX (NORTH AREA)

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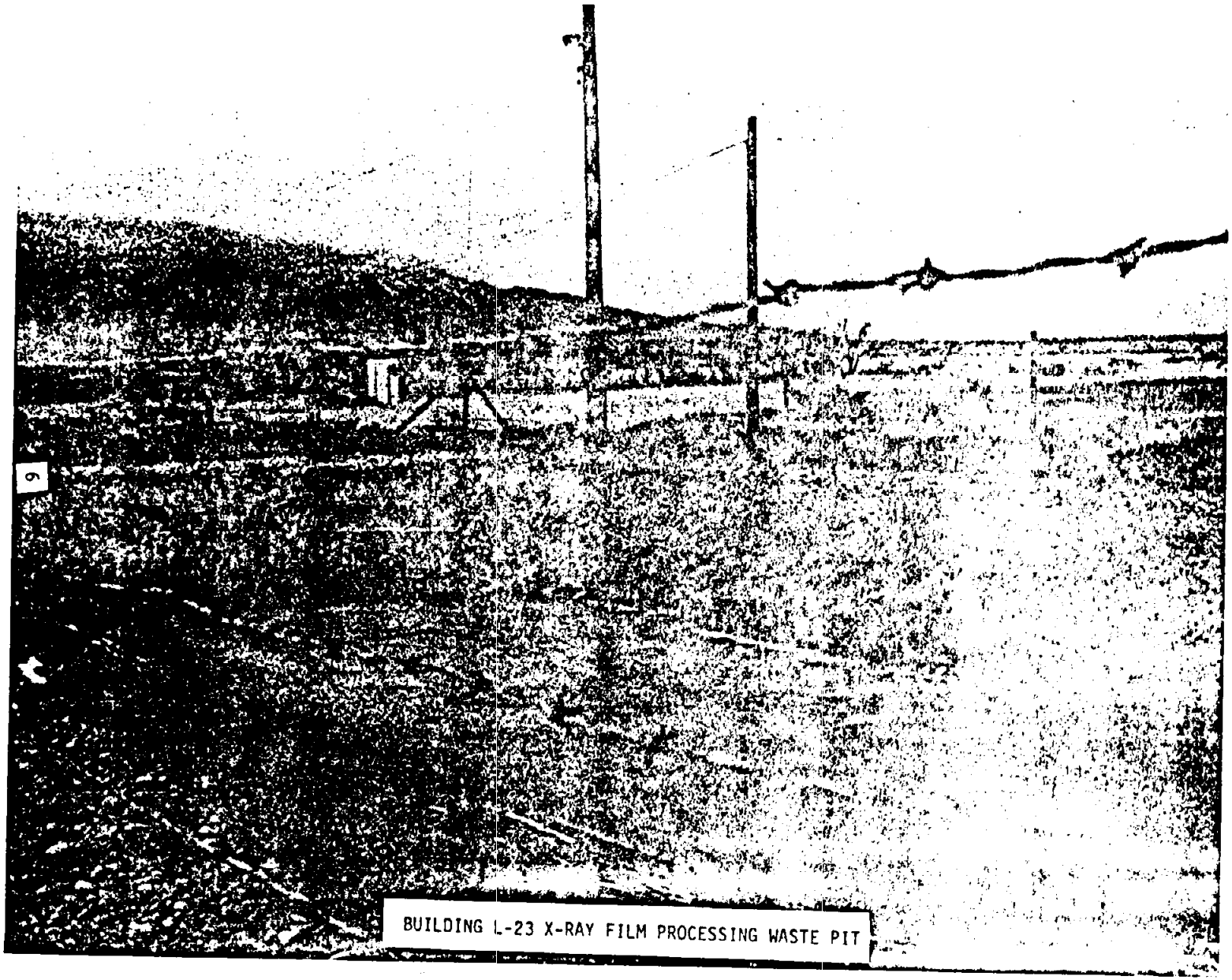
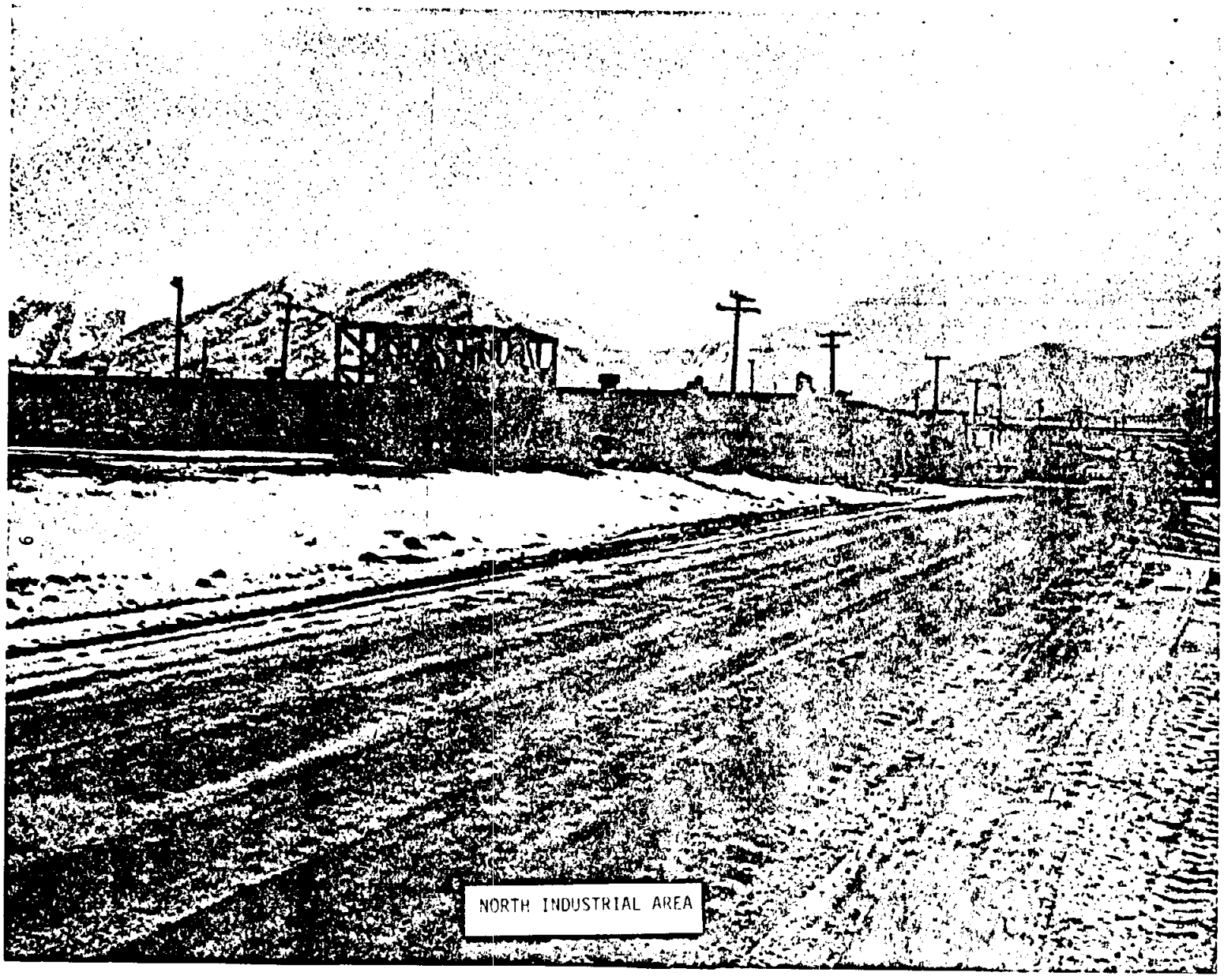
BUILDING S-45 LEACHING PIT AREA



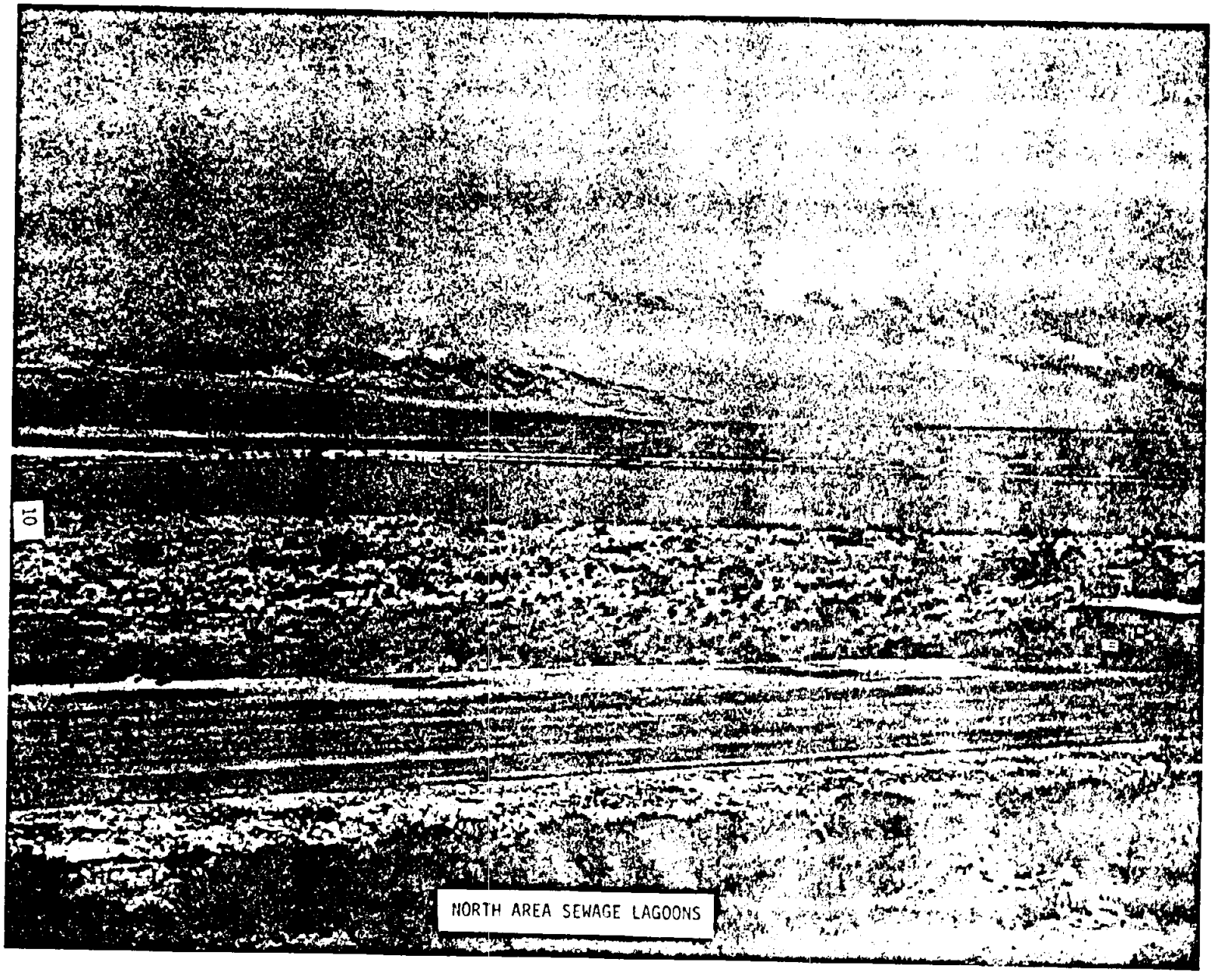
BUILDING L-23 X-RAY FILM PROCESSING WASTE PIT

NORTH AREA LANDFILL (AERIAL)

GRAVEL PIT IN NORTH AREA DEMOLITION GROUNDS



NORTH INDUSTRIAL AREA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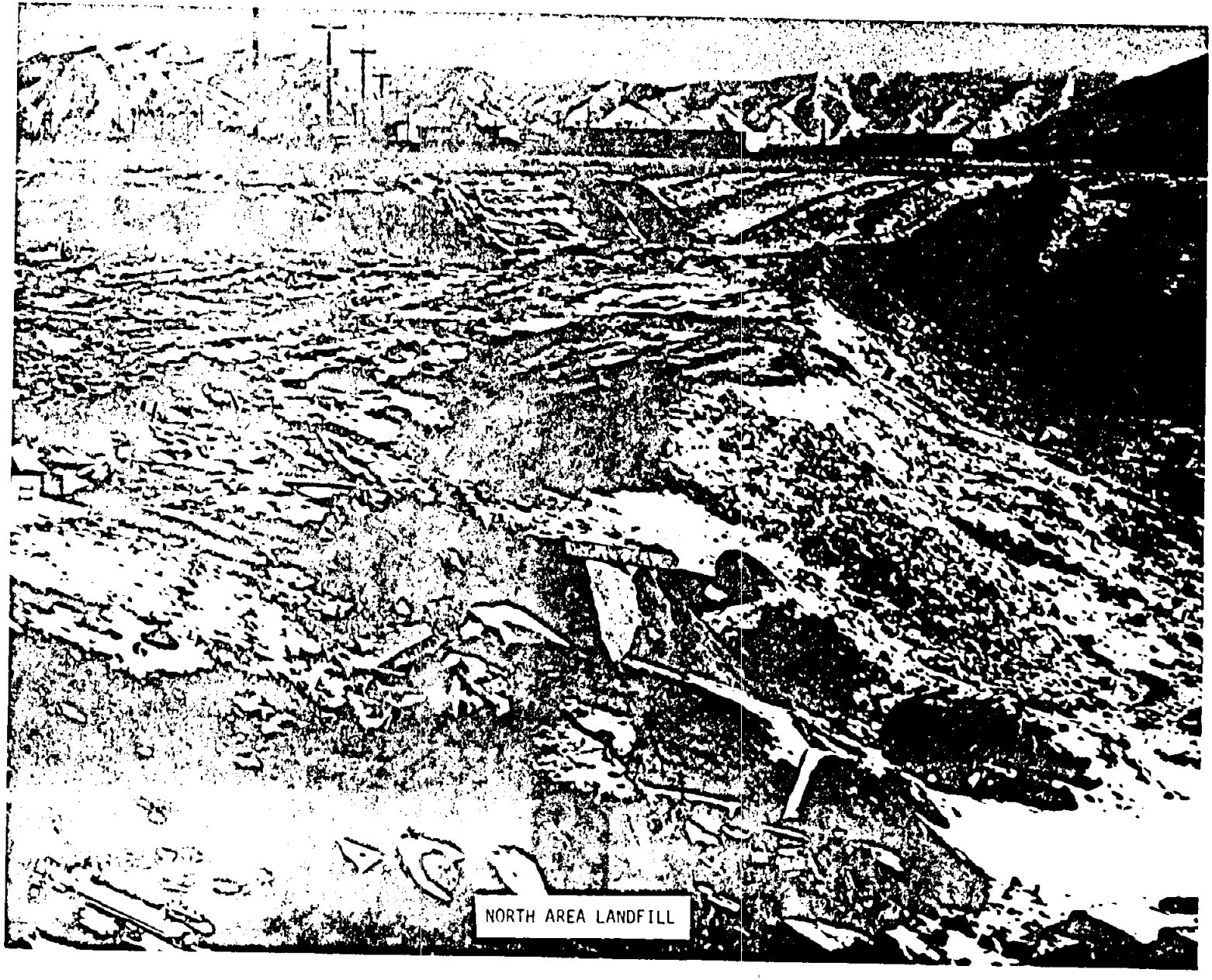
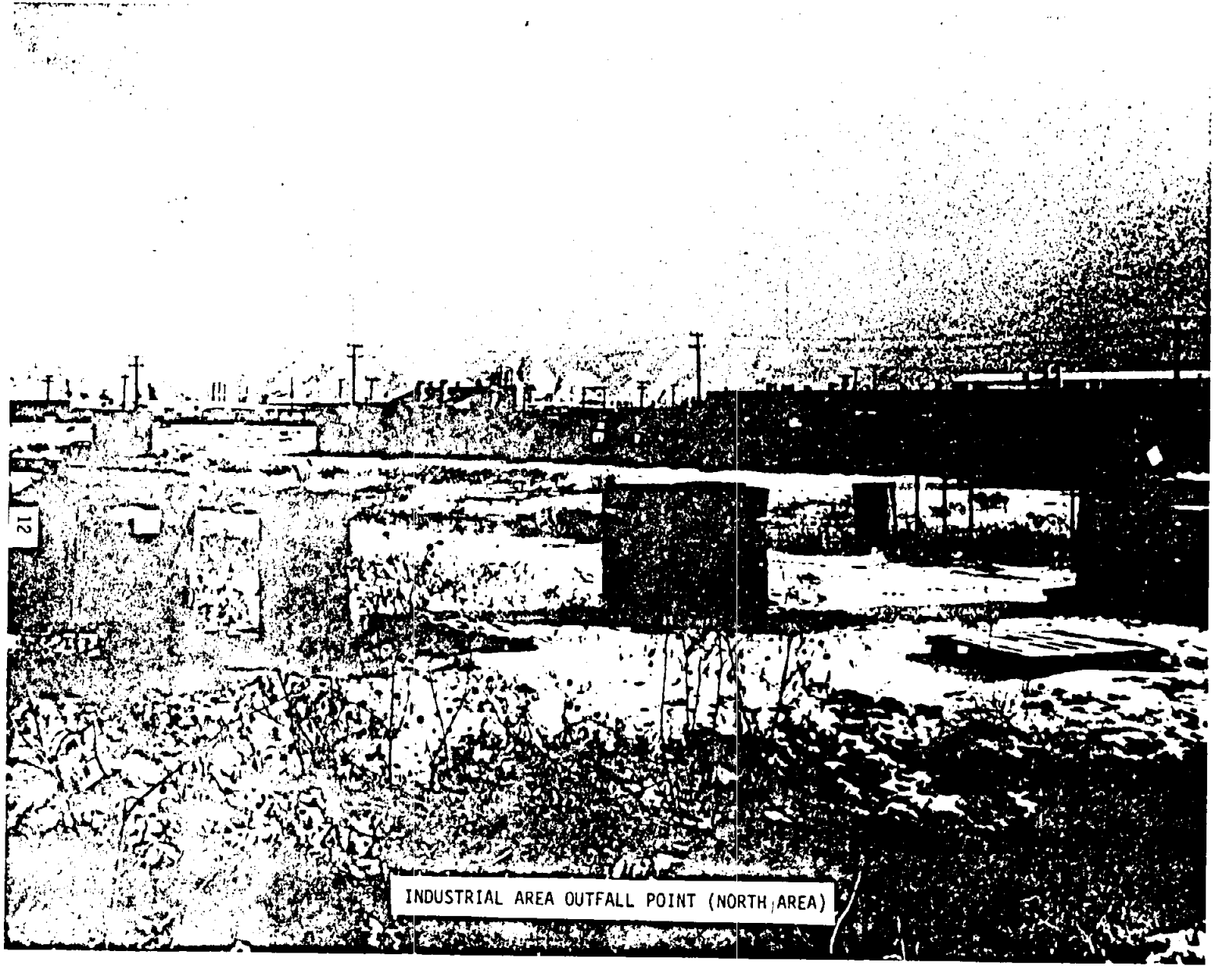
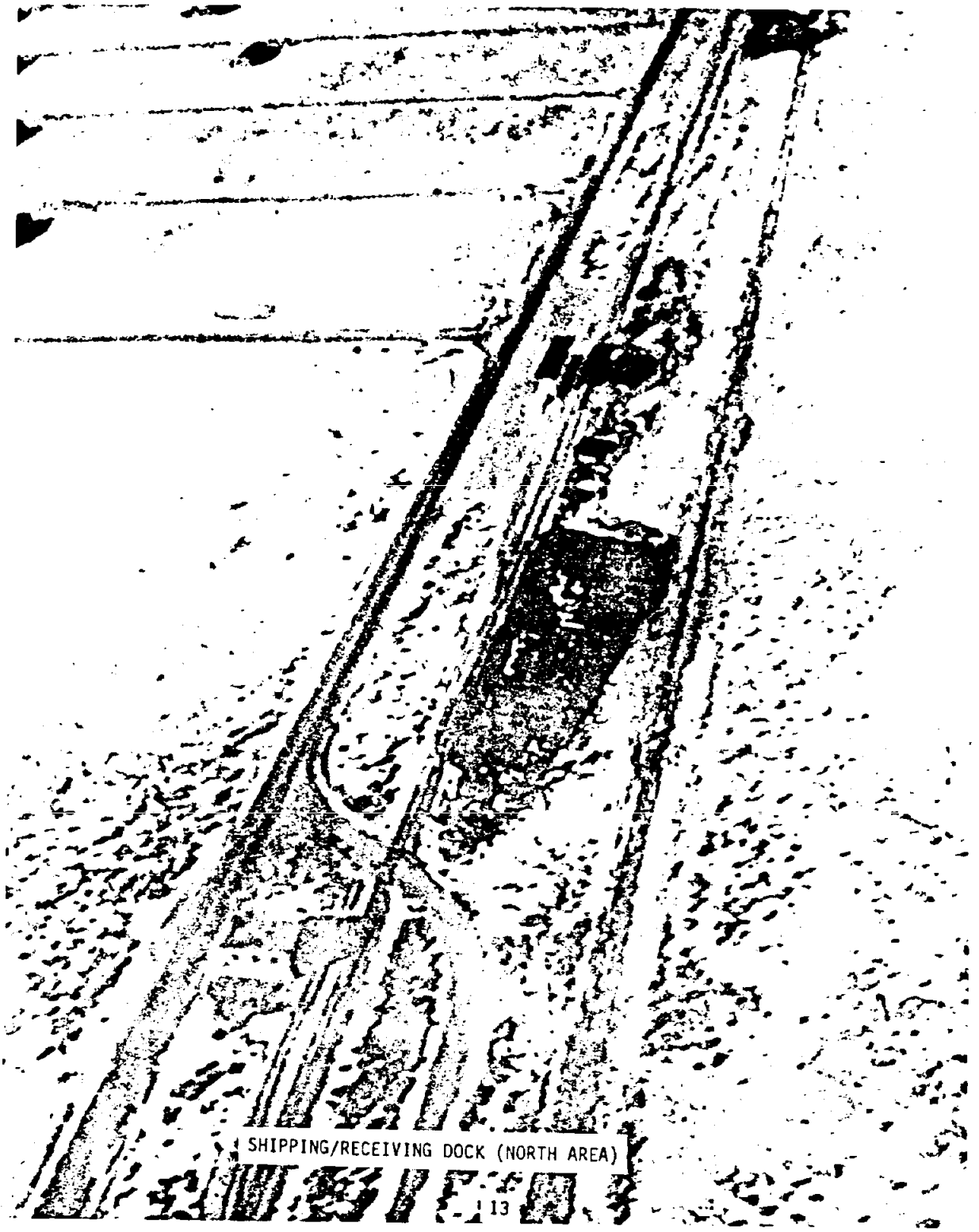
NORTH AREA SEWAGE LAGOONS


NORTH AREA LANDFILL

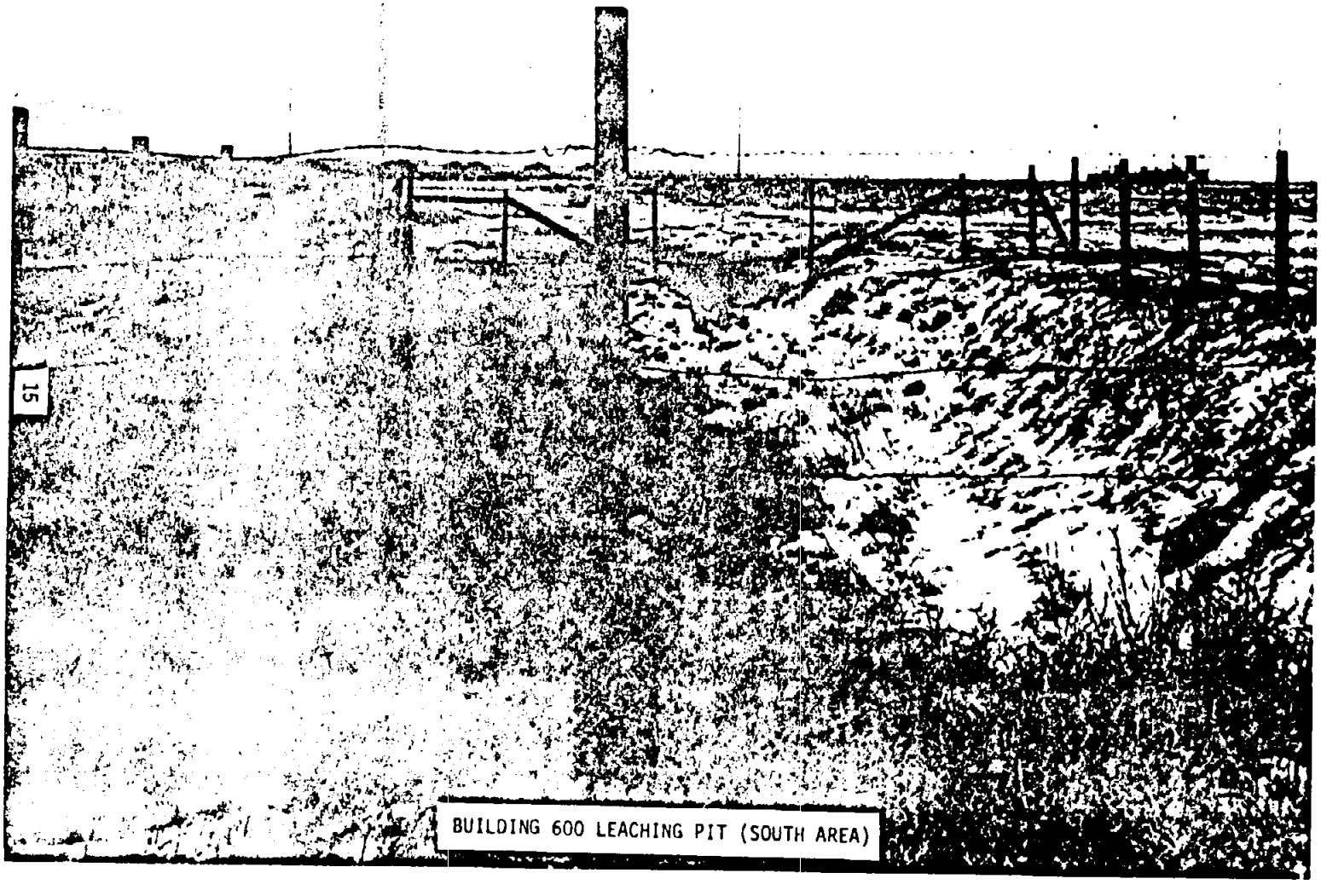


INDUSTRIAL AREA OUTFALL POINT (NORTH AREA)



SHIPPING/RECEIVING DOCK (NORTH AREA)


RIELLE - NORTH AREA
14



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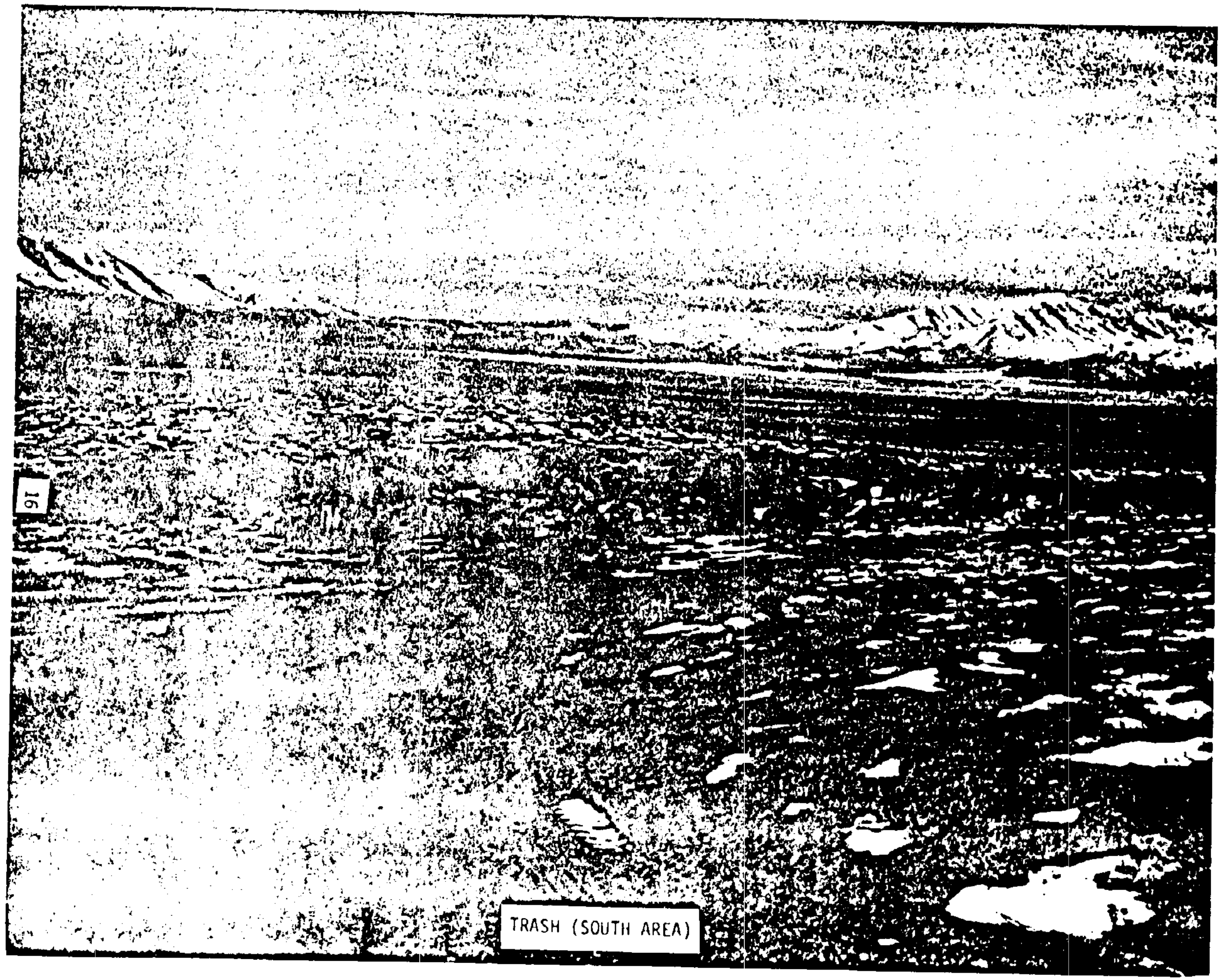
BUILDING 600 LEACHING PIT (SOUTH AREA)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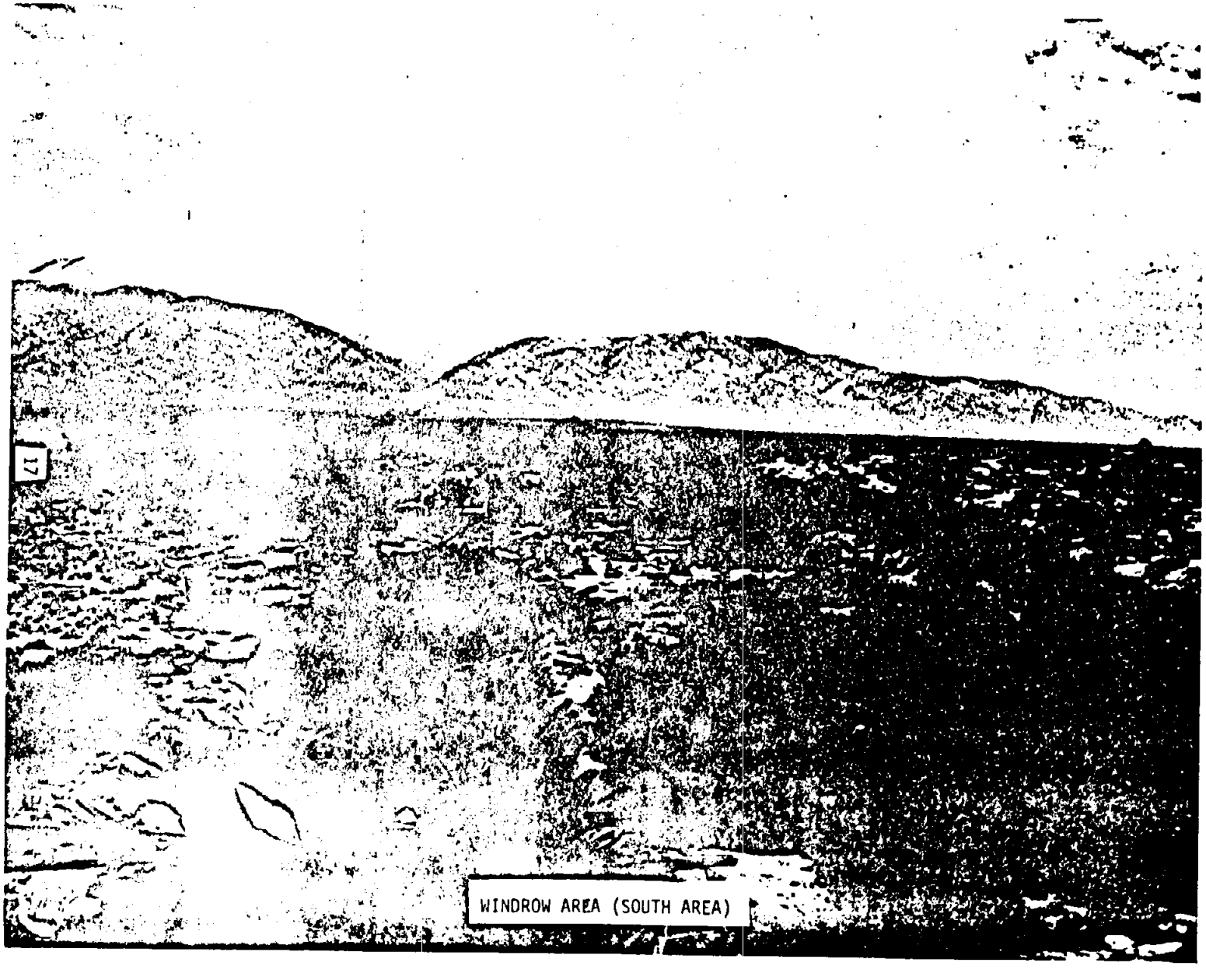
TRASH (SOUTH AREA)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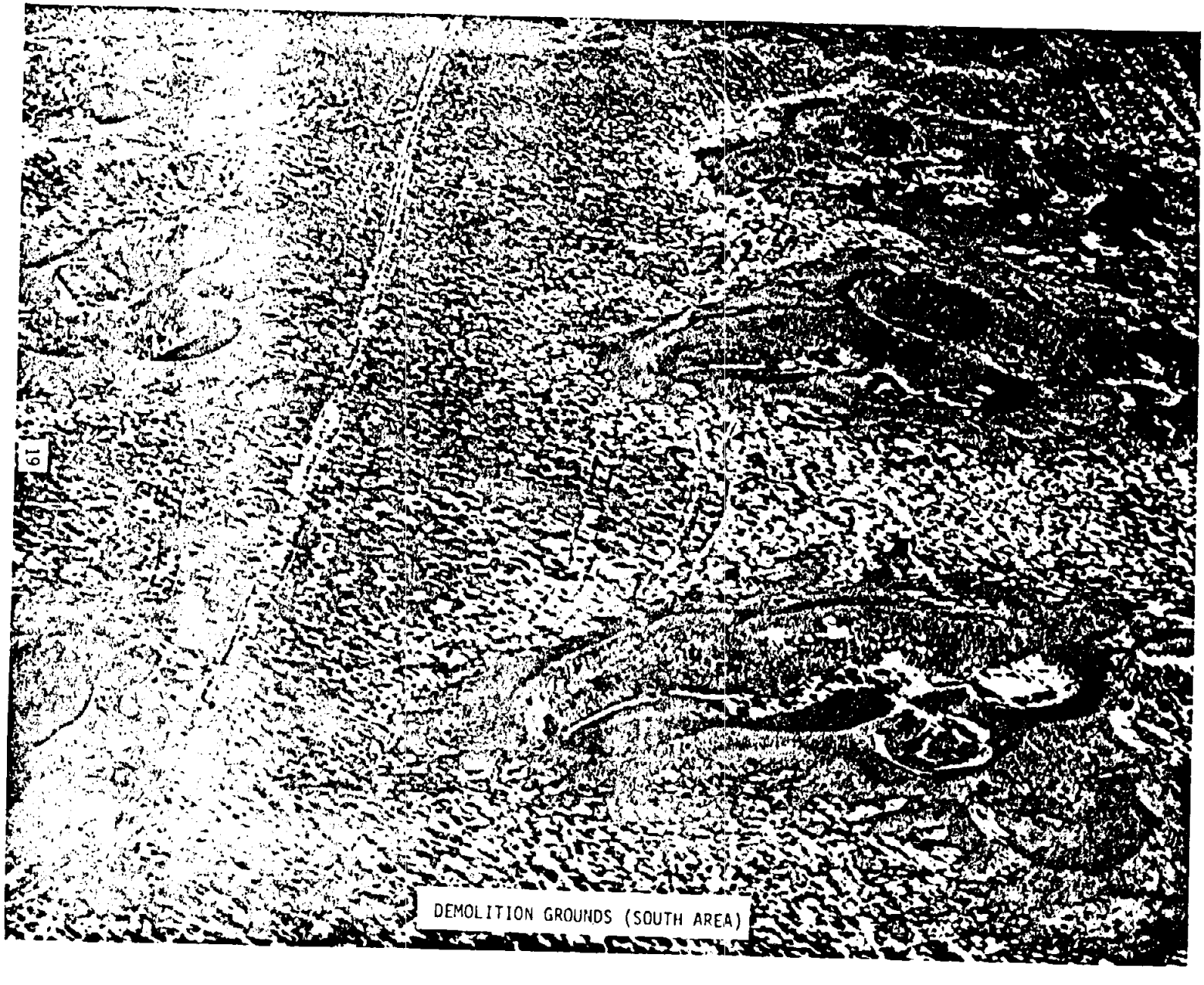
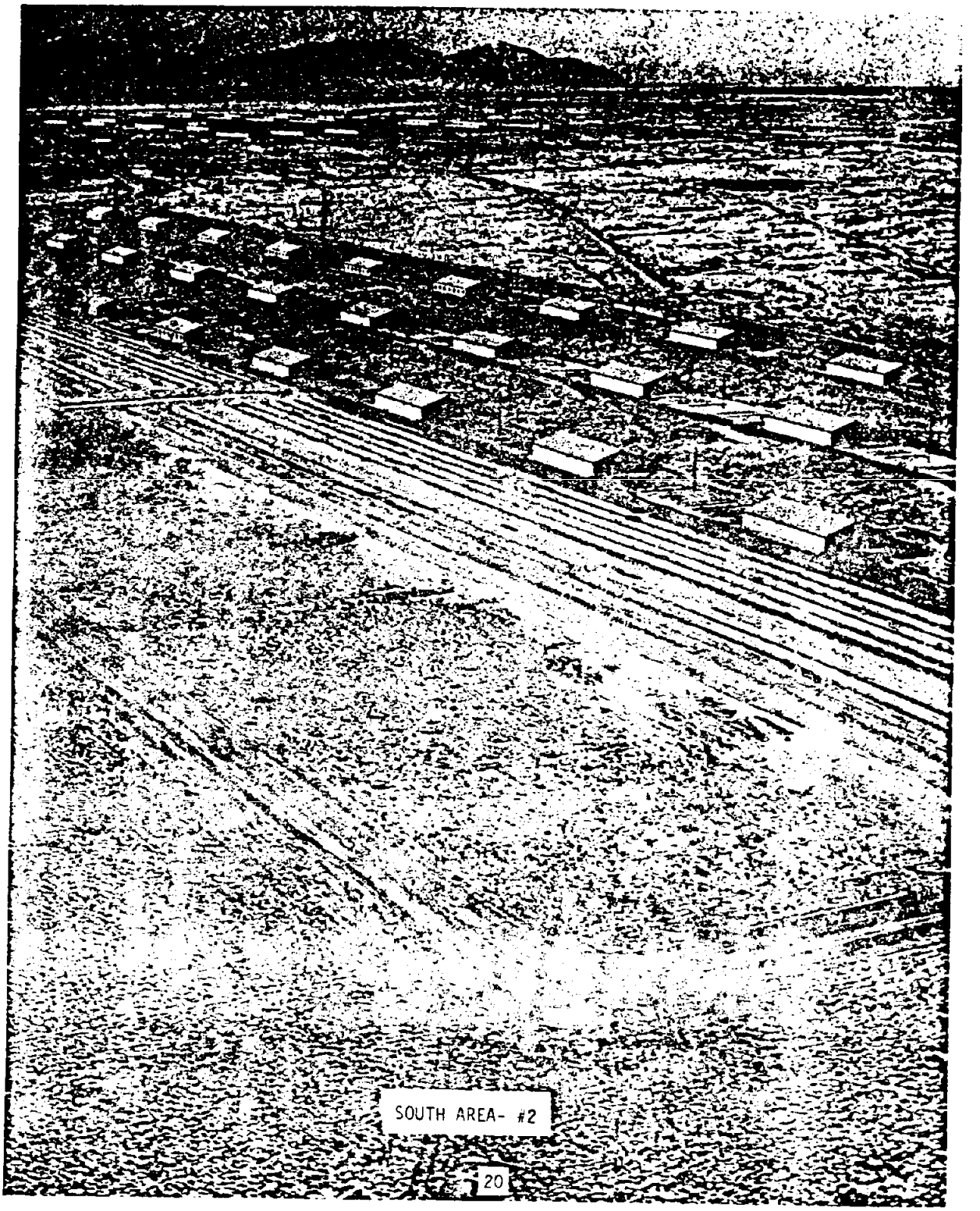
WINDROW AREA (SOUTH AREA)

WINDROWS (AERIAL)

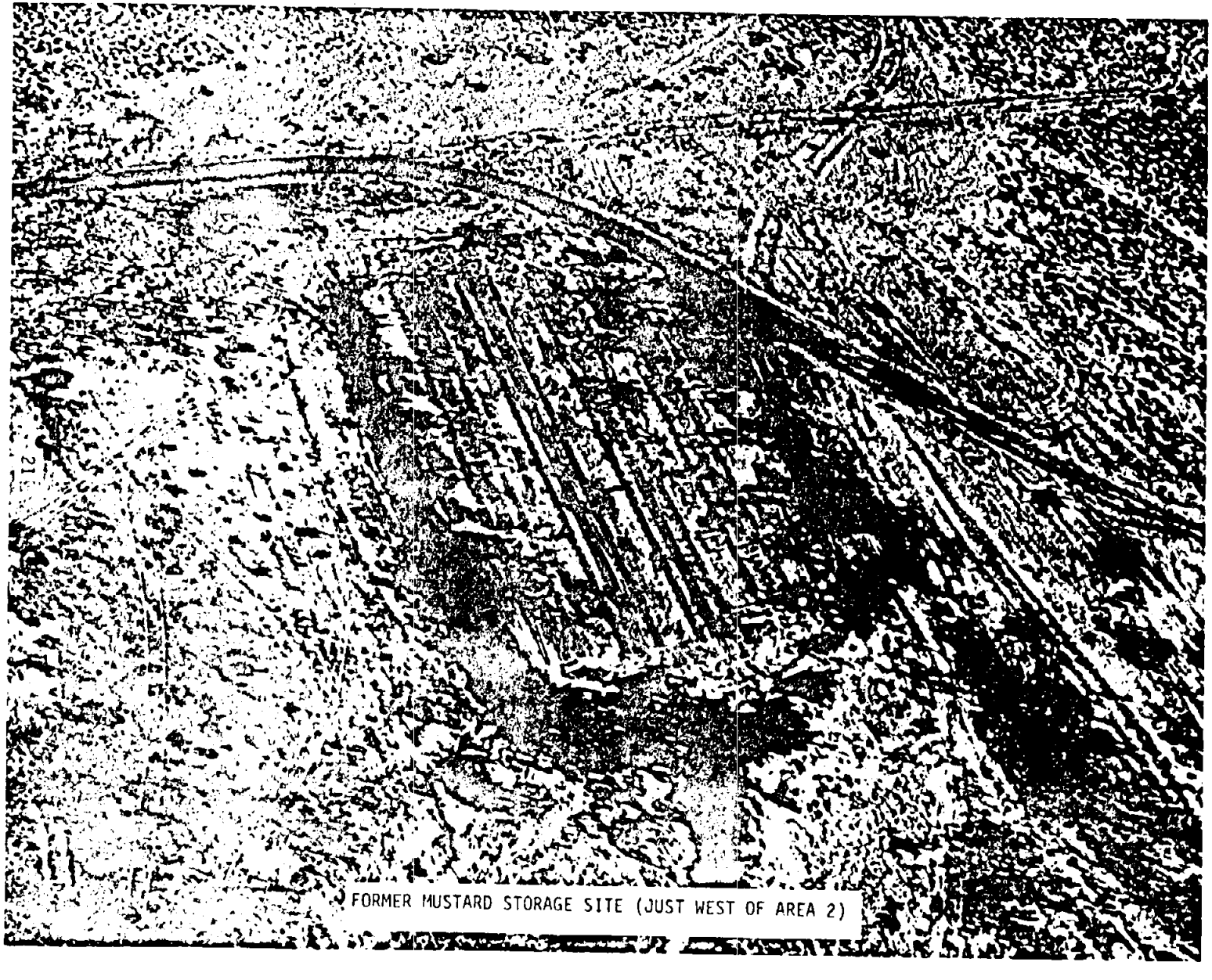


DEMOLITION GROUNDS (SOUTH AREA)

61

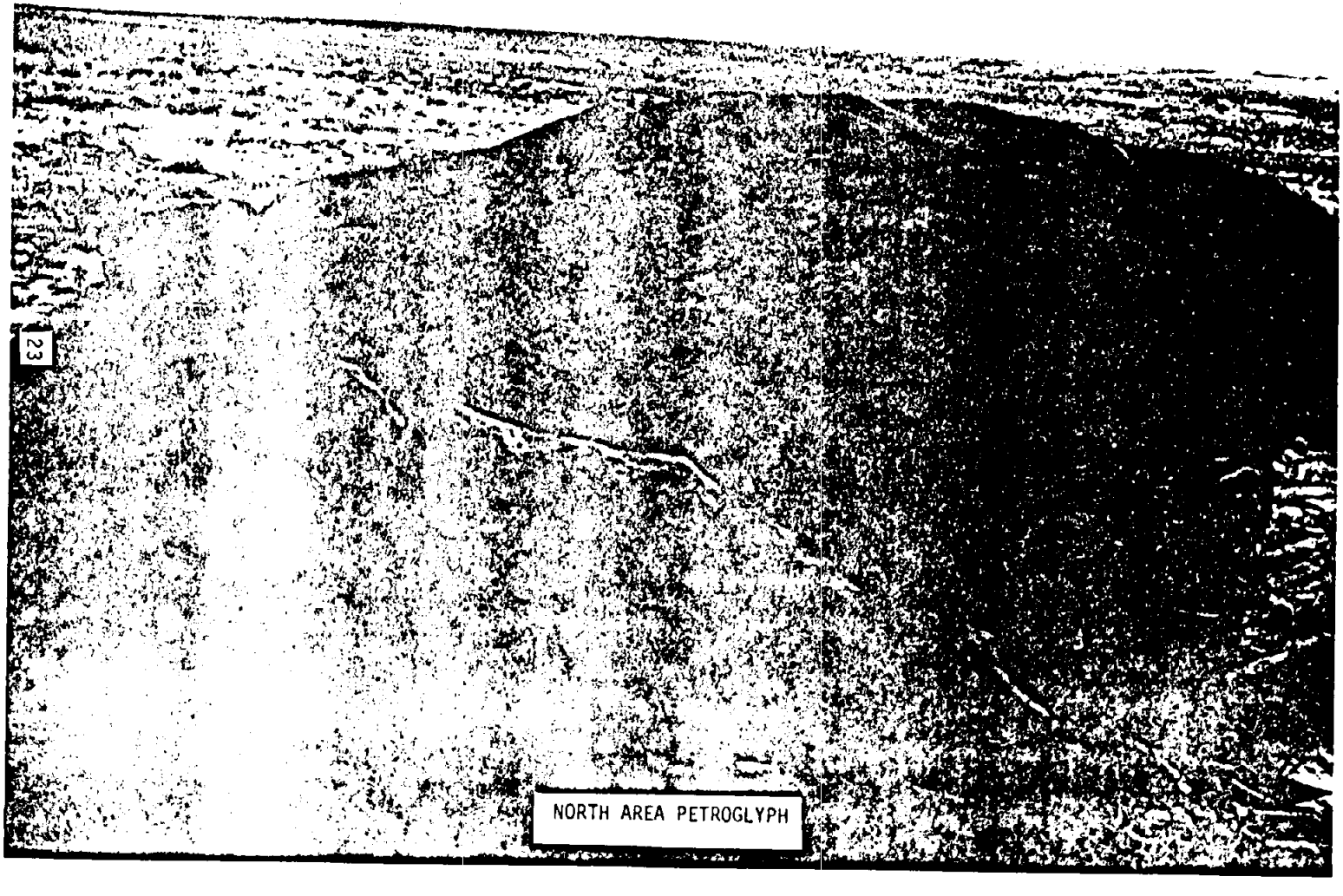


SOUTH AREA- #2



FORMER MUSTARD STORAGE SITE (JUST WEST OF AREA 2)


SOUTH AREA LANDFILL
22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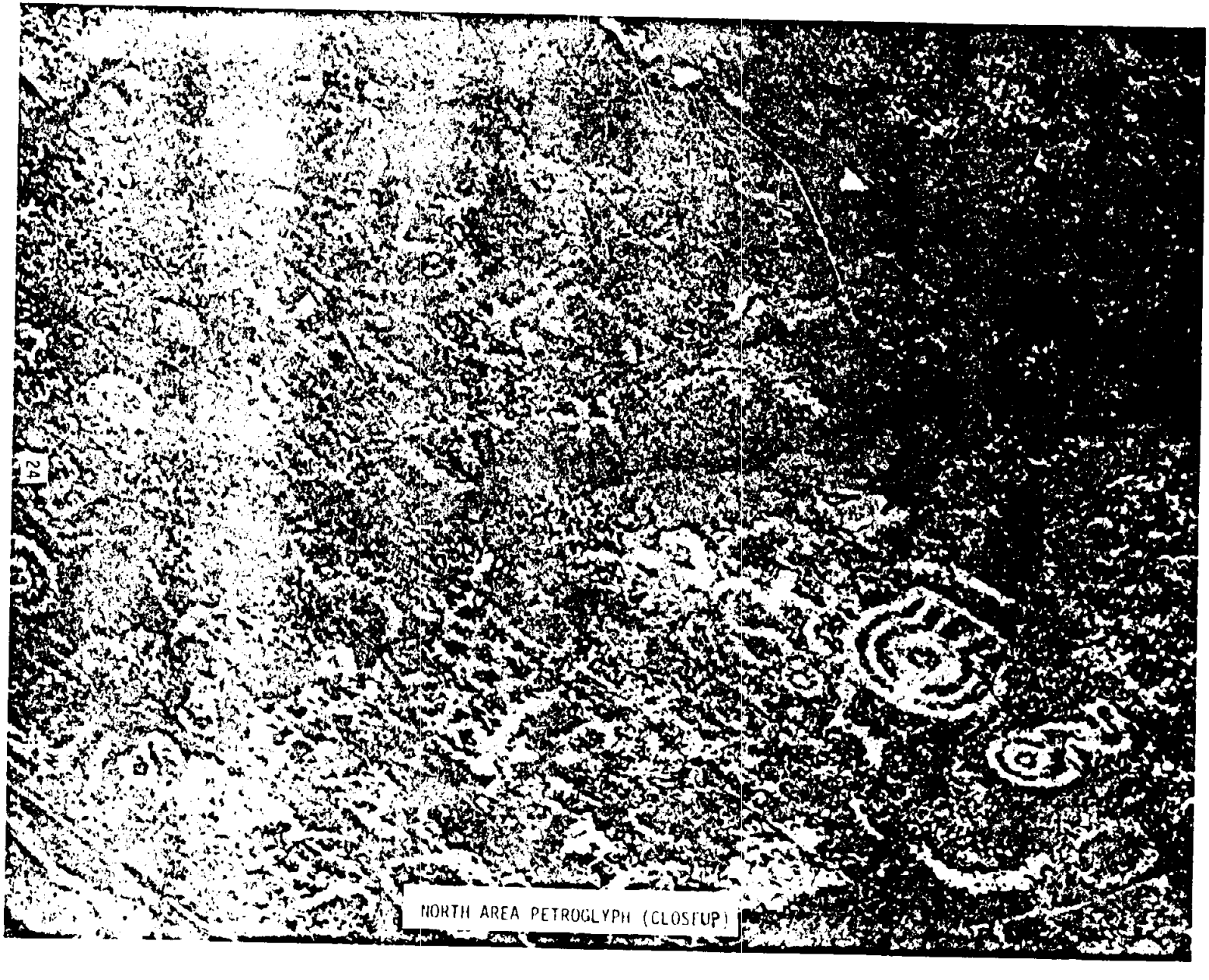
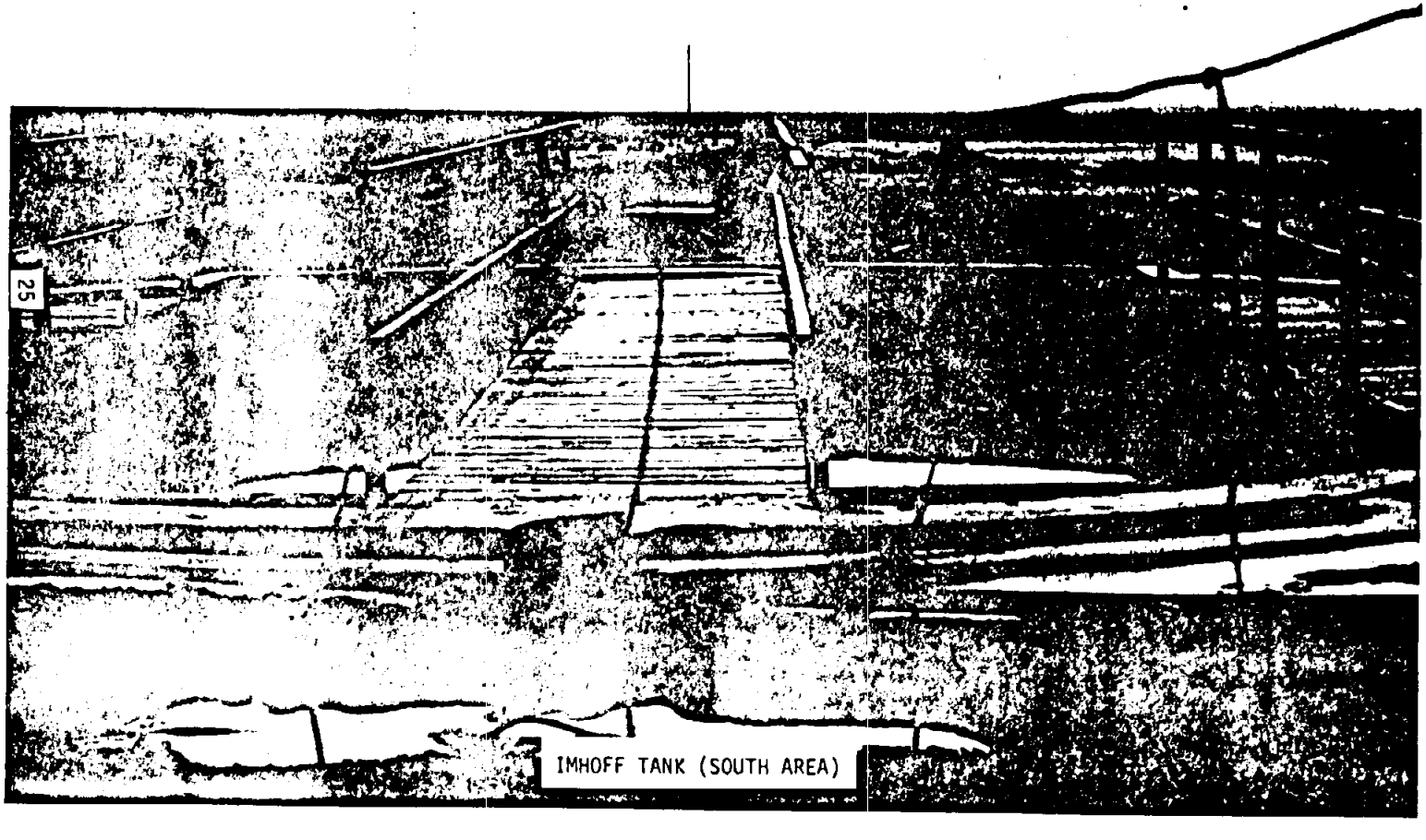
NORTH AREA PETROGLYPH

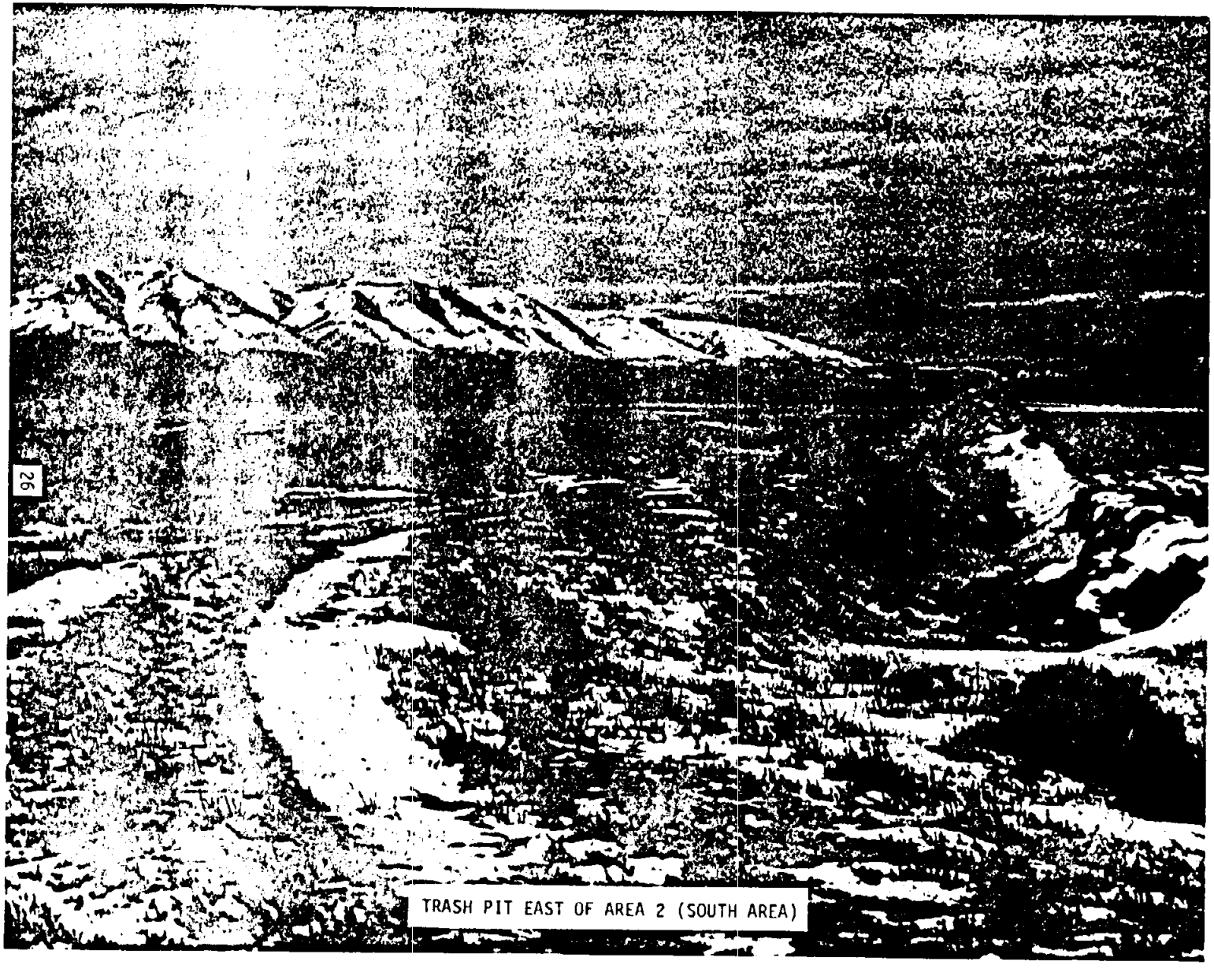


NORTH AREA PETROGLYPH (CLOSEUP)



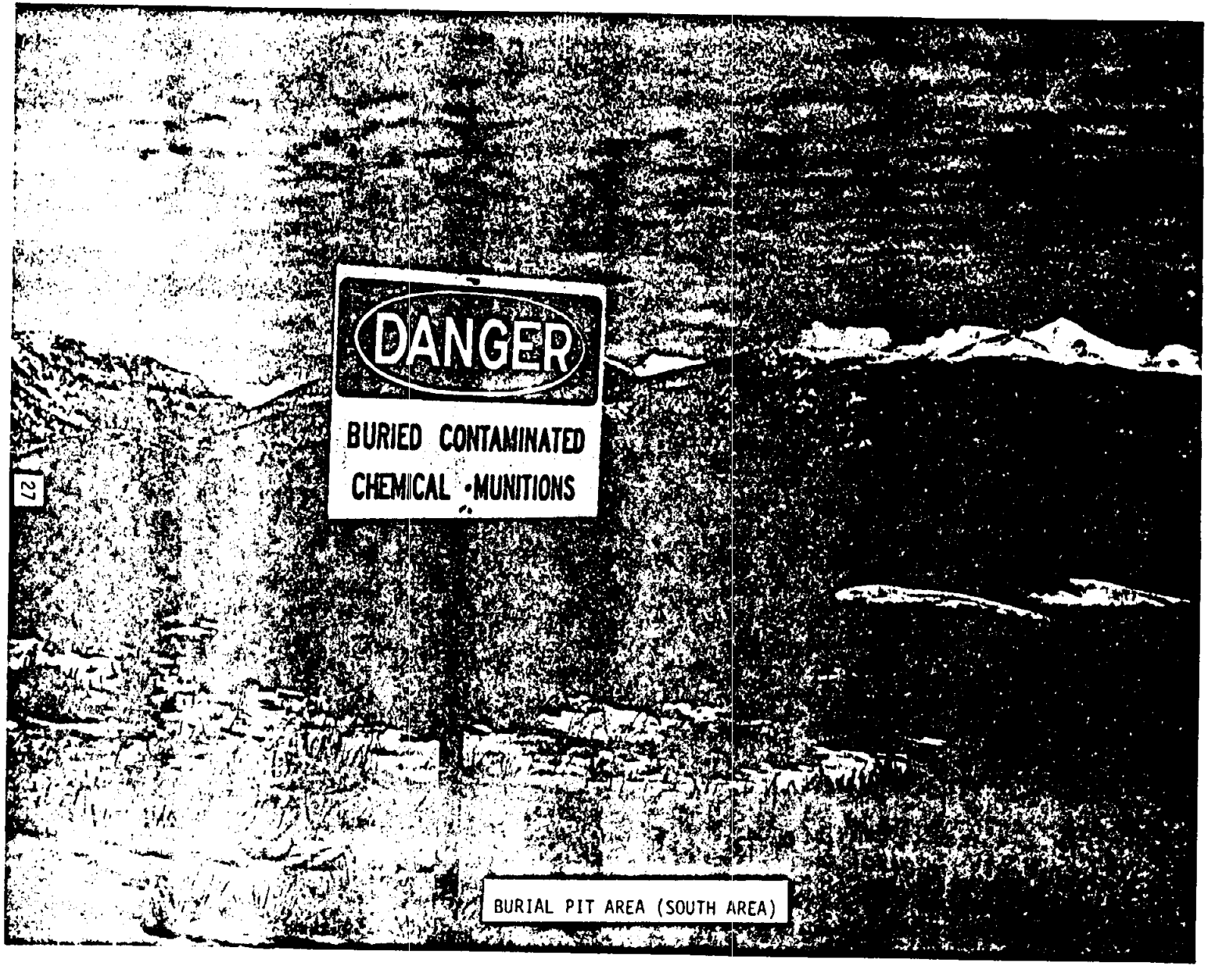
25

IMHOFF TANK (SOUTH AREA)

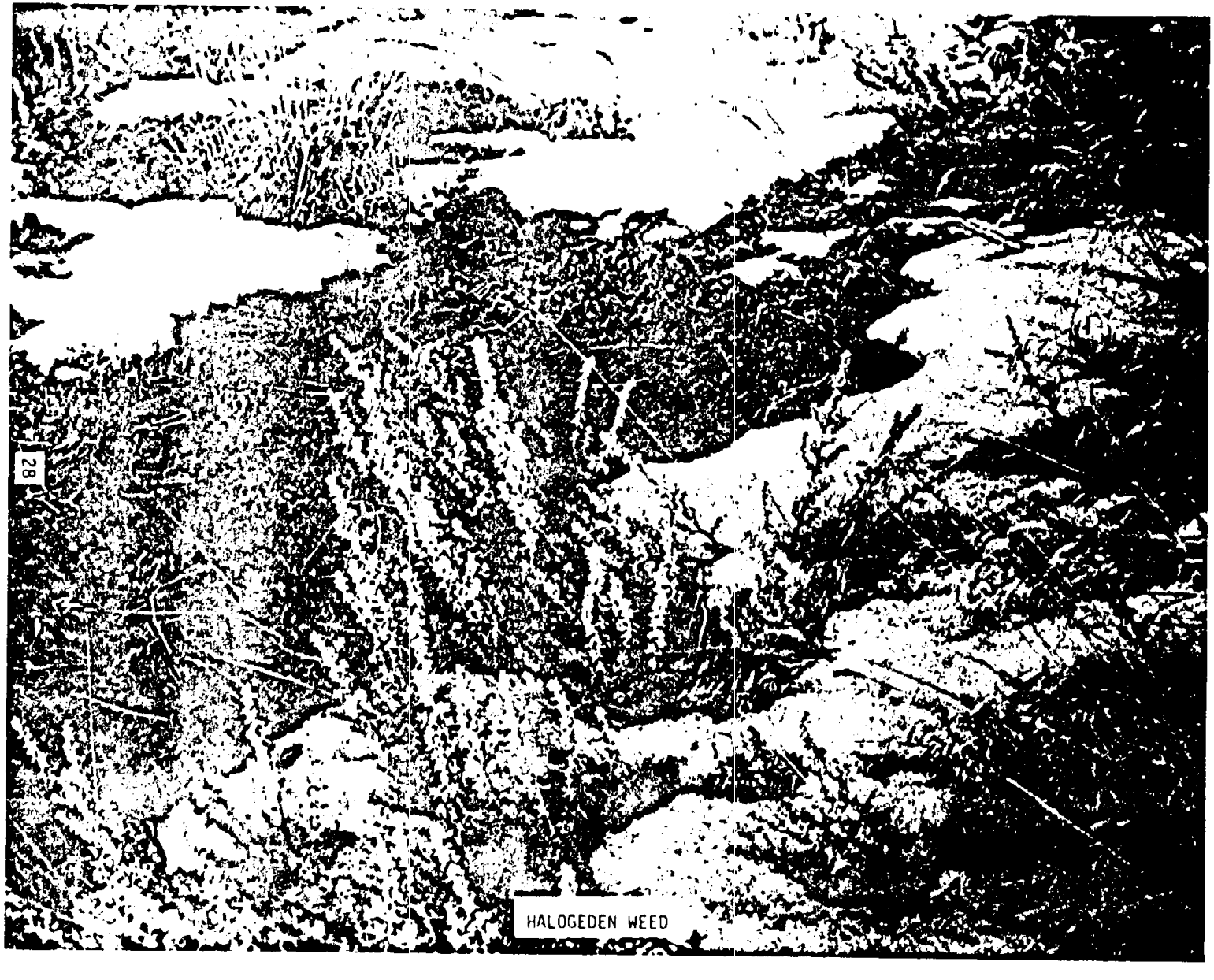


26

TRASH PIT EAST OF AREA 2 (SOUTH AREA)



BURIAL PIT AREA (SOUTH AREA)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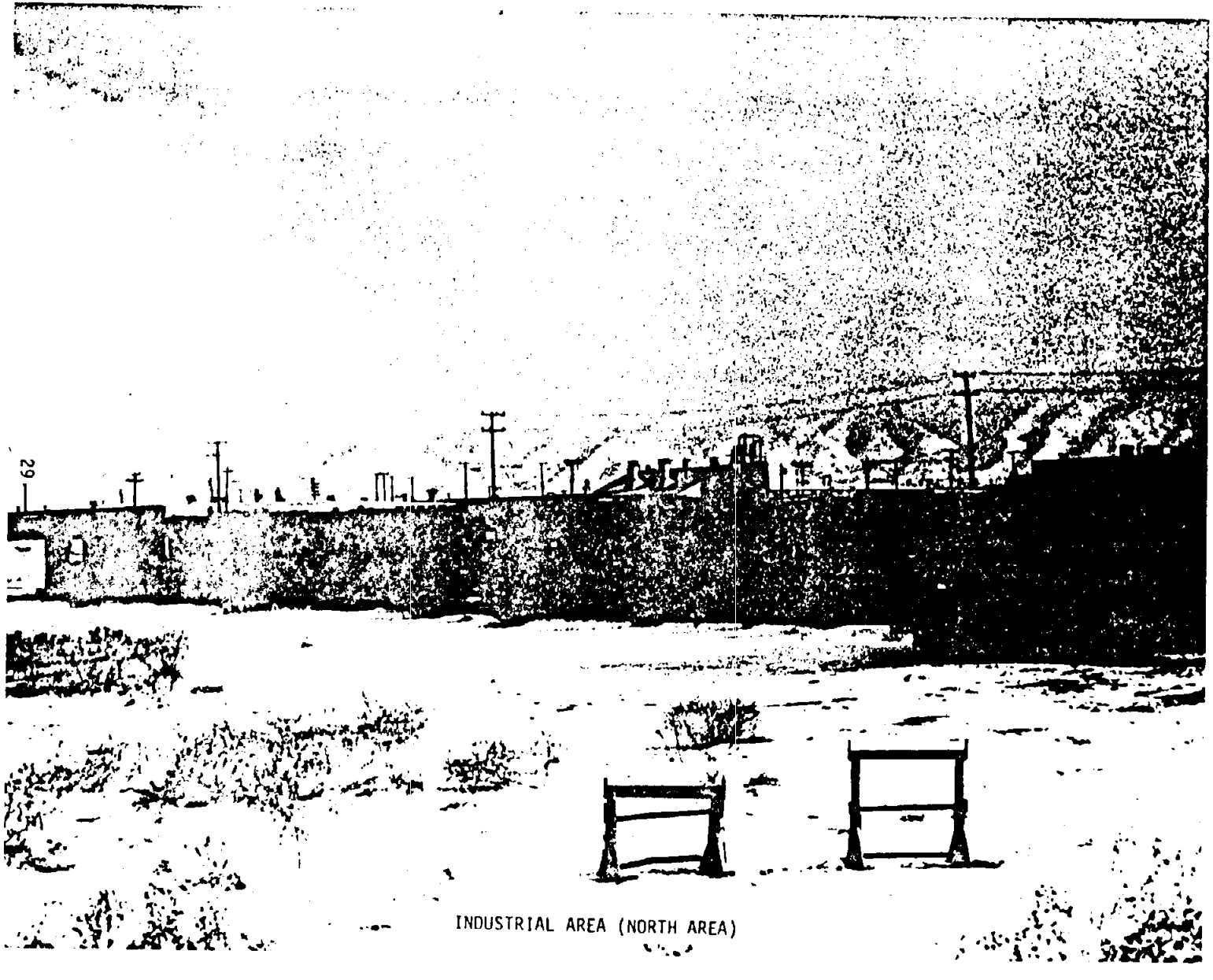
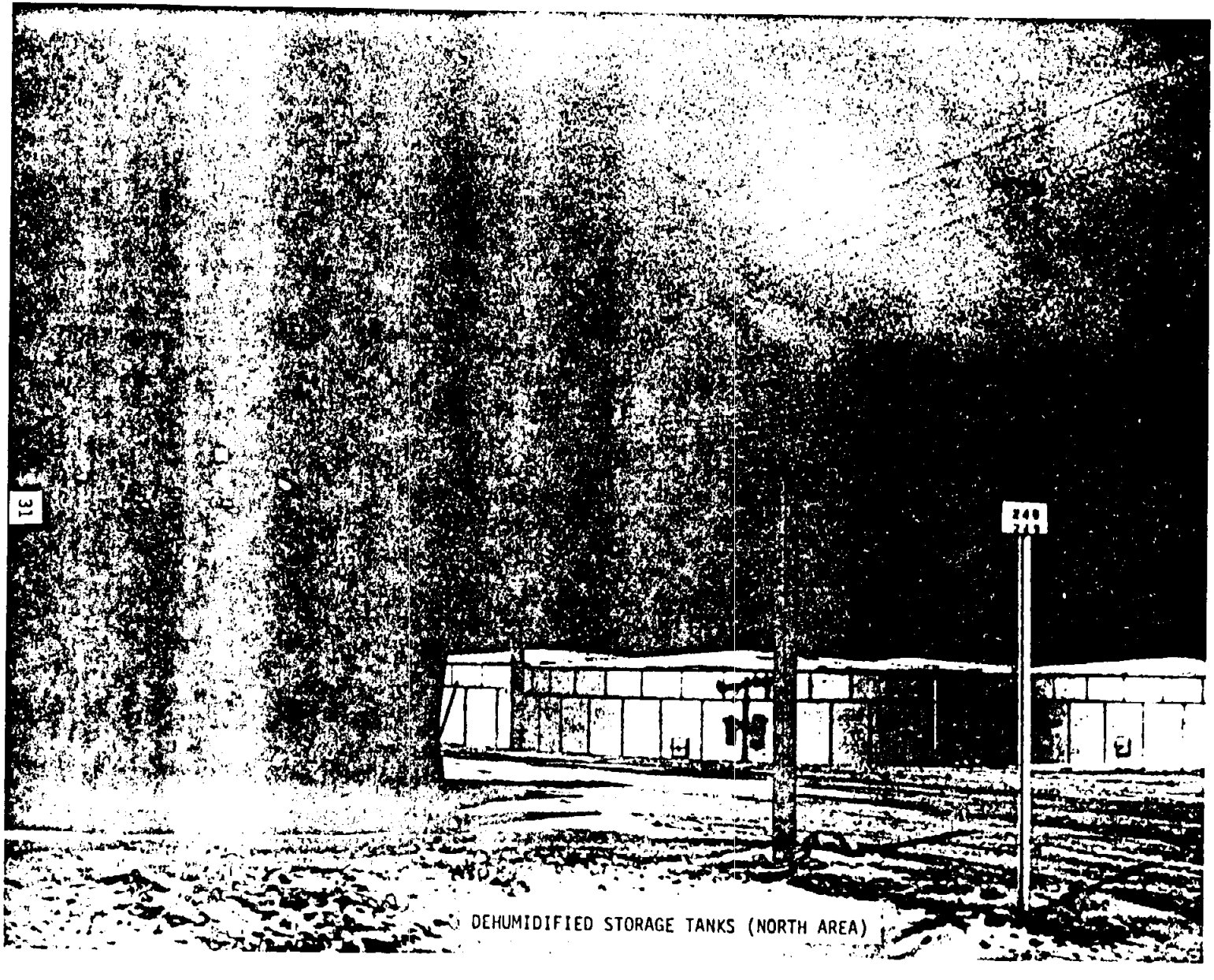
HALOGEDEN WEED



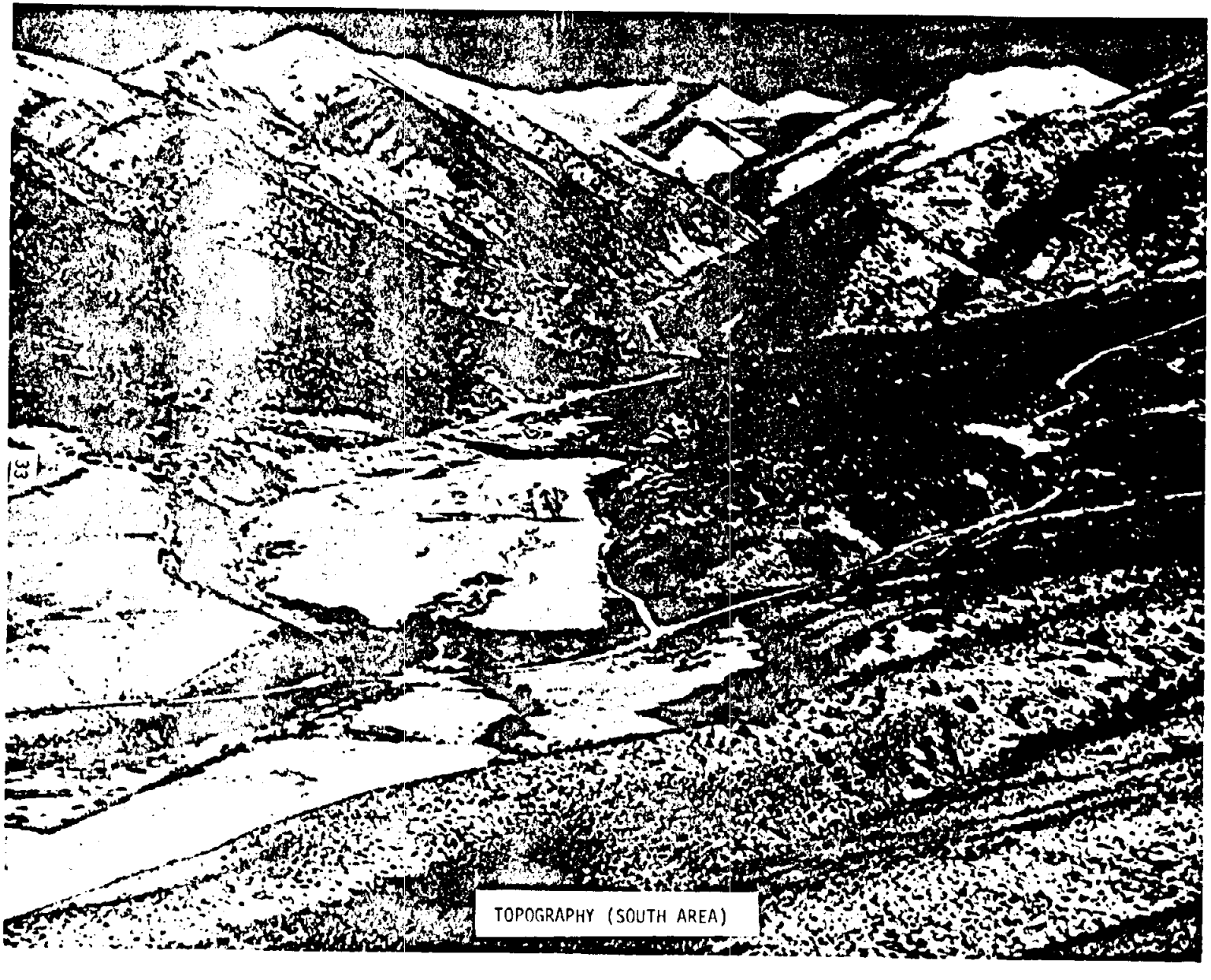
INDUSTRIAL AREA (NORTH AREA)

PLATING OPERATIONS (NORTH AREA)



DEHUMIDIFIED STORAGE TANKS (NORTH AREA)

TOPOGRAPHY (NORTH AREA)



TOPOGRAPHY (SOUTH AREA)

APPENDIX B

BIOTA
OF
TOOELE ARMY DEPOT

A Checklist of Plants for Dugway, Utah and Vicinity
by Seville Flowers
(Names updated in 1978)

Thallophyta (Phylum) Thallus plants
Algae (Subphylum) Algae

Myxophyceae (Class) Blue-green Algae

Anabaena oscillarioides Bory At Fish Springs
Chroococus turgidus (Kuetz.) Naeg At Fish Springs
Lyngbya major Menegh. At Fish Springs
Merismopedia tenuissima Lemm. At Fish Springs
Nodularia spumigena Mertens At Fish Springs

Chrysophyceae (Class) Diatoms

Amorpha sp. At Fish Springs
Cymbella sp. At Fish Springs
Diatoma hiemale At Fish Springs
Epithemia gibba At Fish Springs
Gyrosigma sp. At Fish Springs
Navicula sp. At Fish Springs
Nitzschia sigma At Fish Springs
Surirella striatula At Fish Springs

Chlorophyceae (Class) Green Algae

Cladophora fracta (Dill.) Kuetz. At Timpie Spring and pond
Cladophora glomerata (L.) Kuetz. At Timpie Spring and pond
Cladophora kuetzingianum Grunow. At Timpie Spring and pond
Enteromorpha intestinalis (L.) Grev. At Timpie Spring and pond
Enteromorpha prolifera var. tubulosa (Kuetz.) Reinbold At Timpie Spring and pond
Entermorpha salina Kuetz. At Timpie Spring and pond
Mugeotia capucina (Bory) Agardh At Fish Springs
Mugeotia parvula Hassell At Fish Springs
Rhizoclonium crassipellitum var. robustum G. S. West At Timpie Spring and pond
Rhizoclonium crispus Kuetz. At Timpie Spring and pond
Rhizoclonium hieroglyphicum (Ag.) Kuetz. At Timpie Spring and pond
Spirogyra spp. At Fish Springs
Ulva lactucae Linn. At Timpie Spring and pond
Zygnema cruciatum (Vauch.) Agardh. At Fish Springs

Plants

Basidiomycetes (Class)

Uredinales

Ustilago hypodytes (Schlecht.) On Orysopsis hymenoides

Ustilaginales Rusts

Phragmidium montivagum Arthur. On Rosa spp.
Puccinia aristidae Tracy I. On Sarcobatus vermiculatus
Puccinia grindeliae Peck III. On Tetradymia glabrata, Butierrezia spp. and Solidago trinervata spp.
Uromyces intricatus Cooke III. On Eriogonum spp.
Uromyces punctulatus Schroet. III. On Astragalus heliophilus

Lichens (Class) Lichens

Acarosporaceae (Family

Acarospora cervina (Ach.) Mass.
Acarospora flavovirescens Arn.
Acarospora rhabarbarina Hue
Acarospora scabra (Pers.) T. Fr.

Buelliaceae (Family)

Buelliella parmeliarum (Sommerf.) Fink

Caloplacaceae (Family)

Caloplaca bolacina (Tuck.) Herre
Caloplaca elecans (Link.) T. Fr.
Caloplaca elecans var. *trachyphylla* Fink
Caloplaca lobulata (Floerke) Hellb.
Caloplaca pyracea (Ach.) T. Fr.

Collemaceae (Family)

Synechoblastus coccophorus (Tuck.) Fink
Synechoblastus fascicularis (L.) A. L. Smith
Synechoblastus wyomingensis Fink

Dermatocarpaceae (Family)

Dermatocarpon hepaticum (Ach.) T. Fr.
Dermatocarpon miniatum (L.) Mann.
Dermatocarpon miniatum var. *complicatum* (Lightf.) T. Fr.

Plants

Lecanoraceae (Family)

Lecanora frustulosa (Dicks.) Asch.
Lecanora rubina (Vill.) Ach.

Lecidiaceae (Family)

Lecidea parasema Ach.
Psora crenata (Tayl.) Reinke
Psora decipiens (Ehrh.) Hoffm.
Psora decipiens fo. dealbata (Torss.) Mass.
Rhizocarpon disporum (Naeg.) Mull. Arg.
Toninia caeruleonigricans (Lightf.) T. Fr.

Physciaceae (Family)

Physcia caesia (Hoffm.) Hampe
Physcia stellaris (L.) Nyl.

Teloschistaceae (Family)

Xanothoria candellaria (L.) Kickx.
Xanothoria polycarpa (Ehrh.) Oliv.
Xanothoria flavicans (L.) Kickx.

Bryophyta (Phylum) Mosses

Musci (Class) True mosses

Bryaceae (Family)

Bryum cuspidatum (B. & S.) Schimp.
Bryum pallescens Schleich.
Bryum pseudotriquetrum (Hedw.) Schwaegr.

Encalyptaceae (Family)

Encalypta vulgaris var. mutica Brid.

Grimmiaceae (Family)

Grimmia anodon Bry. Eur.
Grimmia alpestris Nees

Hypnaceae (Family)

Brachythecium collinum Bry. Eur.
Brachythecium lamprochryseum C. M. & Kindb.
Brachythecium rivulare B. & S.
Leptodictyum trichopodium var. kochii (B. & S.) Broth.
Hygroamblystedium irriuum var. spinifolium (Schleich.) Grout

Orthotrichaceae (Family)

Orthotrichum cupulatum (Hoffm.) Brid.
Orthotrichum pallii James
Orthotrichum tennellum Bruch

Pottiaceae (Family)

Tortula bistratosa Flowers
Tortula inermis (Brid.) Mont.
Tortula mucronifolia Schwaegr.
Tortula ruralis (Ehrh.) Smith

Spermatophyta (Phylum) Seed Plants

Gymnospermae (Class) Conifers

Cuppressaceae (Family)

Juniperus osteosperma (Torr.) Little Utah Juniper

Ephedraceae (Family) Jointfirs

Ephedra nevadensis S. Wats. Jointfir

Pinaceae (Family) Pines

Pinus monophylla Torr. & Frem. Single-leaf pinyon

Angiospermae (Class) Flowering Plants

Aceraceae (Family) Maples

Acer glabrum Torr. Rocky Mountain Maple
Acer grandidentatum Nutt. Big-tooth Maple
Acer negundo L. Boxelder

Amaranthaceae (Family) Amaranthus

Amaranthus graecizens L. Prostrate pigweed

Anacardaceae (Family) Cashews

Rhus trilobata Nutt. Squawbush

Apiaceae (Family) Carrotts

Cymopterus acaulis (Pursh) Raf.
Lomatium dissectum (Nutt.) M. & C.
Lomatium grayi C. & R.

Apocynaceae (Family) Dogbanes

Apocynum cannabium L. Indian hemp Dogbane

Asclepiadiaceae (Family) Milkweeds

Asclepias speciosa Torr. Milkweed

Asteraceae (Family) Sunflowers

Ambrosia acanthocarpa Hook. Annual Bursage
Arctium minus (Hill) Bernh. Burdock
Artemisia arbuscula Nutt. Low Sagebrush
Artemisia dracunculus L. Tarragon Sagewort
Artemisia ludoviciana Nutt. Louisiana Sagewort
Artemisia spinescens D. C. Eat. Budsage
Artemisia tridentata Nutt. Big Sagebrush
Aster brachyactis Blake Aster
Brickellia microphyla (Nutt.) Gray
Chaenactis douglasii H. & A.
Chrysothamnus nauseosus (Pall.) Britt. Rabbitbrush
Chrysothamnus viscidiflorus (Hook.) Nutt. Rabbitbrush
Chrysothamnus viscidiflorus (Hook.) Nutt. ssp. *puberlus* (D.C.Eat.)
Chrysothamnus viscidiflorus (Hook.) Nutt. ssp. *stenophyllus* (Gray) H. & A.
Chrysothamnus viscidiflorus (Hook.) Nutt. ssp. *viscidiflorus* L. Anders.
Cirsium utahense Blake Thistle
Conyza canadensis (L.) Cronq.
Crepis acuminata Nutt. Hawksbeard
Erigeron divergens T. & G. Fleabane
Erigeron pumilus Nutt. Fleabane
Grindelia squarrosa (Pursh) Dunal. Gumweed
Helianthus annuus L. Sunflower
Helianthus anomalus Blake Sunflower
Iva axillaris Pursh Poverty Sumpweed
Iva xanthifolia Nutt. Rag Sumpweed
Lactuca serriola L. Prickly Lettuce
Leucelene ericoides (Torr.) Greene
Lygodesmia dianthopsis (D.C. Eat.) Tomb. Skeletonweed
Malacothrix sonchoides (Nutt.) T. & G. Desert Dandelion
Perityle stansburii (Gray) McBride
Petradoria pumila (Nutt.) Greene Rock Goldenrod
Senecio multilobatus T. & G. Groundsel
Solidago sparsiflora Gray Goldenrod
Sonchus asper (L.) Hill Sowthistle
Stephanomeria exigua Nutt. Wire Lettuce
Stephanomeria spinosa (Nutt.) Tomb Spiny Wire Lettuce
Tetradymia glabrata Gray Littleleaf Horsebrush
Tetradymia nuttallii T. & G. Nuttall Horsebrush
Tetradymia spinosa H. & A. Spiny Horsebrush
Townsendia florifer (Hook.) Gray
Tragopogon dubius Scop. Salsify
Xanthium strumarium L. Cocklebur
Xanthocephalum (Gutierrezia) sarothrae (Pursh) Shinners Snakeweed

Berberidaceae (Family) Barberries

Berberis repéns Lindl. Oregon Grape

Boraginaceae Borages

Coldenia nuttallii Hook
Cryptantha crassisepala (T. & G.) Greene Catseye
Cryptantha flavoculata (A. Nels.) Payson Catseye
Cryptantha humilus (Gray) Payson Catseye
Cynoglossum officinale L. Hounds Tongue
Heliotropium convolvulaceum (Nutt.) Gray Heliotrope
Lappula redowskii (Hornem.) Greene Stickseed

Brassicaceae (Family) Mustards

Arabis holboellii Hornem. Rockcress
Cardaria draba (L.) Desv. Whitetop
Descurainia pinnata (Walt.) Britton Tansy Mustard
Descurainia sophia (L.) Webb.
Erysimum asperum (Nutt.) DC. Wallflower
Erysimum repandrum L. Wormseed
Hutchensia procumbens (L.) DC.
Lepidium densiflorum Schrad. Pepperweed
Lepidium montanum Nutt. Pepperweed
Lepidium perfoliatum L. Pepperweed
Malcalmia africana (L.) R. Br. African Mustard
Physaria acutifolia Rydb. Twinpod
Sisymbrium altissimum L. Tumblemustard
Stanleya pinnata (Pursh) Britt. Princesplume

Cactaceae (Family) Cactus

Opuntia polycantha Haw. Prickly Pear

Capparaceae (Family) Capers

Cleome lutea Hook. Yellow Rocky Mountain Beeplant
Cleome serrulata Pursh Rocky Mountain Beeplant

Caprifoliaceae (Family) Honeysuckle

Sambucus caerulea Raf. Elderberry
Symphoricarpos longiflorus A. Gray Snowberry
Symphoricarpos oreophilus A. Gray Snowberry

Celastraceae (Family) Bittersweets

Pachistima myrsinites Raf. Mountain Lover

Chenopodiaceae (Family) Goosefoots

Allenrolfea occidentalis (S. Wats.) Kuntze Pickleweed
Atriplex canescens (Pursh) Nutt. Fourwing Saltbush
Atriplex confertifolia (T. & F.) S. Wats. Shadscale
Atriplex gardneri (Moq.) Dietr. Low Saltbush
Atriplex truncata (Torr.) Gray Wedgescale Saltbush
Atriplex rosea L. Tumbling Orach
Bassia hyssopifolia (Pall.) Kuntze
Chenopodium album L. Lambsquarters
Chenopodium capitatum (L.) Asch. Blite Goosefoot
Chenopodium fremontii S. Wats. Goosefoot
Chenopodium leptophyllum Nutt. Goosefoot
Corispermum hyssopifolium L. Bugseed
Eurotia lanata (Pursh) Moq. Winterfat
Grayia spinosa (Hook.) Moq. Hopsage
Halogeton glomeratus (Bieb.) C. A. Meyer
Kochia americana S. Wats. Gray Molly
Monolepis nuttalliana (Schult.) Greene
Salicornia europaea L. Samphire
Salsola kali L. Russian Thistle
Sarcobatus vermiculatus (Hook.) Torr. Greasewood
Suaeda torreyana S. Wats. Inkweed

Convolvulaceae (Family) Morning Glories

Cressa truxillensis H. B. K. Alkali Weed (Fish Springs)

Cyperaceae (Family) Sedges

Carex nebrascensis Dewey Sedge
Eleocharis palustris (L.) R. & S. Common Spikerush
Scirpus americanus Pers. American Rush (Fish Springs)
Scirpus maritimus L. Alkali Bulrush

Euphorbiaceae (Family) Spurges

Euphorbia ocellata D. & H. Spurge
Euphorbia parryi Engelm. Spurge

Fabaceae (Family) Peas

Astragalus beckwithii T. & G. Locoweed
Astragalus convallarius Greene
Astragalus geyeri Gray
Astragalus lentiginosus Dougl. Specklepod Locoweed
Astragalus mollissimus Torr. var. thompsonae Barneby
Astragalus utahensis (Torr.) T. & G.
Hedysarum boreale Nutt. Sweetvetch
Lupinus argenteus Pursh Silvery Lupine
Lupinus pusillus Pursh Rusty Lupine
Medicago sativa L. Alfalfa
Melilotus alba Desr. White Sweetclover
Psoralea lanceolata Pursh Scurfpea

Gentianaceae (Family) Gentians

Centaurium exaltatum (Griseb.) Wight

Geraniaceae (Family) Geraniums

Erodium cicutarium (L.) L' Hér Heronsbill

Juncaceae (Family) Rushes

Juncus arcticus Willd. Wiregrass
Juncus torreyi Cov. Torrey Rush

Juncaginaceae (Family) Arrowgrass

Triglochin maritima L. Arrowgrass (Fish Springs)

Lamiaceae (Family) Mints

Marrubium vulgare L. Horehound
Mentha arvensis L. Mint
Salvia dorrii (Kellogg) Abrams Sage

Liliaceae (Family) Lilies

Allium acuminatum Hook. Wild Onion
Allium nevadensis S. Wats. Wild Onion
Smilacina stellata (L.) Desf. Wild Lily of the Valley
Zygadenus paniculatus S. Wats. Deathcamas

Loasaceae (Family) Blazing Stars

Mentzelia albicaulis Dougl. Whitestem Blazing Star
Mentzelia dispersa Wats. Chinese Blazing Star
Mentzelia laevicaulis (Dougl.) T. & G. Blazing Star

Malvaceae (Family) Mallows

Sidalcea neomexicana A. Gray Praire Mallow
Sphaeralcea grossulariaefolia (H. & A.) Rydb. Globemallow
Sphaeralcea munroana (Dougl.) Spach. Globemallow

Najadaceae (Family) Naiad

Najas marina L. (Fish Spring)

Nyctaginaceae (Family) Four O' Clocks

Abronia fragans Nutt. Snowball Sand Verbena
Abronia micrantha Torr. Sandverbena

Onagraceae (Family) Evening Primrose

Camissonia boothii (Dougl.) Raven
Camissonia minor (A. Nels.) Raven
Camissonia parvula (Nutt. ex T. & G.) Raven
Camissonia scapoidea (Nutt.) Raven
Oenothera biennis L.
Oenothera caespitosa Nutt. Evening Primrose
Oenothera pallida Lindl. Pale Evening Primrose

Orchidaceae (Family) Orchids

Epipactis gigantica Dougl. Giant Helleborine

Orobanchaceae (Family) Broomrape

Orobanche californica Cham. & Schlecht. Broomrape
Orobanche fasciculata Nutt. Broomrape

Paperavaceae (Family) Poppies

Argemone munita Dur. & Hilg. Prickly Poppy

Plantaginaceae (Family) Plantains

Plantago major L. Plantain

Poaceae (Family) Grasses

Agropyron cristatum (L.) Gaertn. Crested Wheatgrass,
Agropyron repens (L.) Beauv. Quackgrass
Agropyron smithii Rydb. Bluestem Wheatgrass
Agropyron spicatum (Pursh) Scribn. & Sm. Bluebunch Wheatgrass
Agrostis stolenifera L. Redtop Bentgrass
Aristida purpurea Nutt. Three-awn
Bromus rubens L. Foxtail chess
Bromus tectorum L. Cheatgrass
Distichlis spicata (L.) Greene Saltgrass
Elymus cinereus Scribn. & Merr. Giant Wild Rye
Hilaria jamesii (Torr.) Benth. Galleta Grass
Hordeum brachyantherum Nevsk. Meadow Barley
Hordeum jubatum L. Foxtail Barley
Melica bulbosa Geyer Onion Grass
Muhlenbergia apsirifolia (Nees & Meyer) Parodi Scratchgrass
Oryzopsis nymenoides (R. & S.) Ricker Indian Ricegrass
Phragmites australis (Cav.) Trin. Common Reed
Poa pratensis L. Kentucky Bluegras
Poa sandbergii Vasey Bluegrass
Polypogon monspeliensis (L.) Desf.
Puccinellia airoides (Nutt.) Wats. & Coult. Alkali Grass
Secale cereale L. Rye
Sitanion hystrix (Nutt.) Smith Squirreltail
Sporobolus airoides Torr. Alkali Sacaton

Poaceae continued

Sporobolus contractus Hitch. Spike Dropseed
Sporobolus cryptandrus (Torr.) Gray Sand Dropseed
Stipa comata Trin. & Rupr. Needle and Thread Grass

Polemoniaceae (Family) Phloxes

Eriastrum wilcoxii (A. Nels.) H. L.. Mason
Gilia leptomeria Gray
Gilia sinuata Dougl.
Leptodactylon pungens (Torr.) Nutt.
Phlox hoodii Rich Phlox
Phlox longifolia Nutt. Wild Sweet William

Polygonaceae (Family) Buckwheats

Eriogonum brevicaule Nutt.
Eriogonum cernuum Nutt.
Eriogonum hookeri S. Wats.
Eriogonum kearneyi Tides. var. kearneyi Reveal
Eriogonum microthecum Nutt.
Eriogonum ovalifolium Nutt.
Polygonum aviculare L. Knotweed
Rumex crispus L. Curly Dock
Rumex venosus Pursh Veiny Dock

Primulaceae (Family) Primroses

Dodecatheon pulchellum (Raf.) Merr. Shooting Star
Glaux maritima L. Saltwort (Fish Springs)

Ranunculaceae (Family) Buttercups

Anemone multifida Poir.
Aquilegia formosa Fisch. Red Columbine
Delphinium nuttallianum Pritz Low Larkspur
Ranunculus cymbalaria Pursh. Mountain Buttercup

Rosaceae (Family) Roses

Amelanchier alnifolia Nutt. Serviceberry
Cowania mexicana G. Don. Cliff Rose
Crataegus douglasii Lindl. Hawthorne
Holodiscus dumosus (Hook.) Heller
Petrophytum caespitosum (Nutt.) Rydb. Rock Spirea
Physocarpus alternans (Jones) J. T. Howell Dwarf Ninebark
Prunus virginiana L. Chokecherry
Purshia tridentata (Pursh) DC. Bitterbrush
Rosa nutkana Presl. Wild Rose
Rosa woodsii Lindl. Wild Rose

Rubiaceae (Family) Madders

Galium multiflorum Kell. Bedstraw

Rubiaceae continued

Galium triflorum Michx. Three-flowered Bedstraw

Ruppiaceae (Family) Widgeonweeds

Ruppia maritima L. Widgeongrass

Salicaceae (Family) Willows

Populus angustifolia James Narrowleaf Cottonweed
Salix exigua Nutt. Willow
Salix lasiolepis Benth. Willow

Santalaceae (Family) Sandalwoods

Commandra umbellata (L.) G. Don Bastard Toadflax

Saxifragaceae (Family) Saxifrage

Heuchera parvifl ra Nutt. Alumroot
Ribes aureum Pursn Golden Current
Ribes inerme Rydb. Gooseberry

Scrophulariaceae (Family) Figworts

Castilleja angustifolia (Nutt.) G. Don. Indian Paintbrush
Cordylanthus canescens A. Gray Alkali Birdsbeak
Mimulus guttatus DC. Yellow Monkeyflower

Solanaceae (Family) Potatoes or Nightshades

Lycium halimifolium Mill. Matrimony Vine
Nicotiana attenuata Torr. Wild Tobacco

Tamaricaceae (Family) Tamarix

Tamarix ramosissima Ledeb.

Typhaceae (Family) Cattails

Typha domingensis Pers. Narrowleaf Cattail

Verbenaceae (Family) Verbenas

Verbena bracteata Lag. & Rodr. Big-bract Verbena

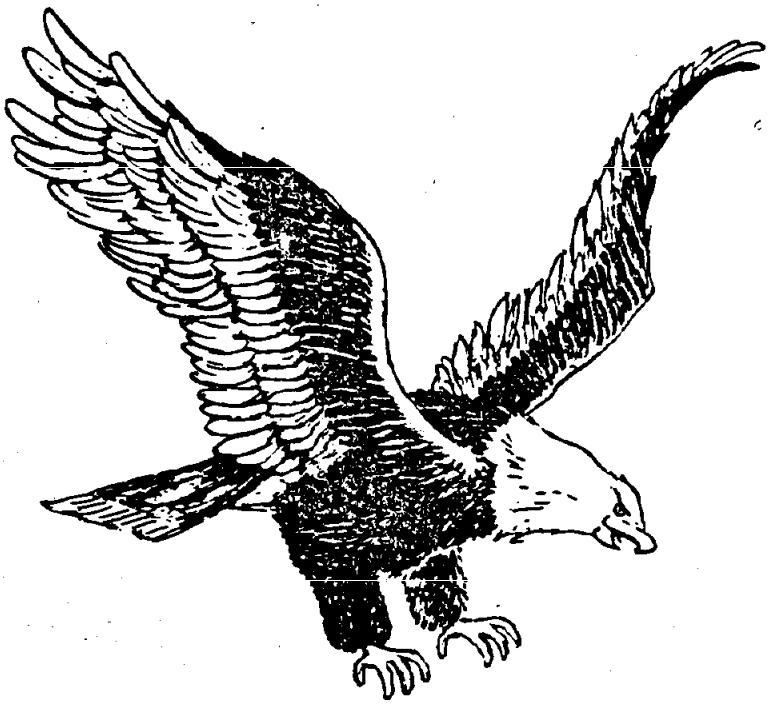
MAMMALS ON TEAD

Badger	Taxidea taxus
Coyote	Canis latrans
Red fox	Vulpes fulva
Bobcat	Lynx rufus
Least chipmonk	Eutamias minimus
Longtail pocket mouse	Perognathus formosus
Ord kangaroo rat	Dipodomys ordii
Great Basin kangaroo rat	Dipodomys microps
Western harvest mouse	Reithrodontomys megalotis
Canyon mouse	Peromyscus crinitus
Deer mouse	Peromyscus maniculatus
Pinon mouse	Peromyscus truci
Northern grasshopper mouse	Onychomys leucogaster
Mountain vole	Microtus montanus
Blacktail jackrabbit	Lepus californicus
Mountail cottontail	Sylvilagus nuttalli
Mule deer	Odocoileus hemionus

APPENDIX C

CAMDS EIS ENVIRONMENTAL ENCLOSURE

OPERATION OF THE CHEMICAL AGENT MUNITIONS DISPOSAL SYSTEM (CAMDS) AT TOOELE ARMY DEPOT, UTAH



MARCH 1977

INCLOSURE NO. 4

TOOELE ENVIRONMENTAL SETTING

FINAL ENVIRONMENTAL IMPACT STATEMENT

OPERATION OF THE

CHEMICAL AGENT MUNITIONS DISPOSAL SYSTEM

(CAMDS)

AT

TOOELE ARMY DEPOT

MARCH 1977

INCLOSURE NO. 4

TOOELE ENVIRONMENTAL SETTING

CONTENTS

LIST OF FIGURES

ENVIRONMENTAL SETTING

The Tooele Army Depot South Area (TEAD-S) is located in a physiographic region known as the basin and range province. It is a region of isolated block mountains and broad intervening valleys and basins. The Depot is situated in Rush Valley and is bounded on the east by the Oquirrh Mountains, on the south by the Sheep Rock and Tintic Mountains, on the west by the Stansbury and Onaqui Mountains, and on the north by South Mountain. There is a general lack of organic soil throughout the area, and practically all of the surface materials came from various derivative forms of the apparent mountain rock. The soil at TEAD-S consists of mixed clay and sand.

The surrounding area is classified by texture, slope, gradient, and topographic formations. It is composed of several broad terrain types and surfaces which include mountains, hills, and alluvial slopes. The salinet features of these types of terrain and surface are summarized in the following paragraphs.

Mountains

The mountains that frame Rush Valley are folded and faulted blocks of sedimentary, metamorphic, and igneous rocks. The diverse topographic expression in the mountains generally reflects the complex internal structure of the blocks, but the present topographic relief is largely the result of movement along fault systems which as a whole trend northward. The mountains are separated by wide valleys which are partially filled with alluvial materials. The general orientation of most of the mountain ranges is north-south. They vary in size from relatively small masses to extensive ranges whose crests are aligned for several miles. Two of these ranges form the east and west boundaries of Rush Valley. General peak elevations in the area range from 5000 to 8000 feet above sea level. A few peaks reach high elevations, Deseret Peak (11031 feet) 15 miles northwest of TEAD-S, and Lone Peak (10572 feet) 10 miles northeast of TEAD-S.

The mountains have a variety of topographic forms, ranging from steep rugged masses to well-rounded hills. Most crest lines are uniform and smooth, but in some cases, differential erosion on tilted strata has produced sharp ridges with craggy pinnacles. Most mountain slopes are covered with rock rubble resulting from weathering by water, wind, and frost. The slopes are moderately steep with average slope gradients of 17 to 46 percent. These gradients are emphasized by the abrupt meeting of the mountain slope with the alluvial deposits on the valley floor.

The mountain streams are perennial or intermittent by nature, flow in deep, V-shaped ravines, and are swelled by rare cloudbursts and springtime runoff. The stream beds are strewn with cobblestones and boulders and are separated by sharp ridges.

Hills

During the course of time, some mountains have been reduced to hills by the forces of erosion. The surface materials consist of coarse gravel and scattered cobblestones, 2 to 10 inches in diameter. Only an occasional badly-weathered rock outcrop denotes the existence of the former rock mass. The hills are gently rounded and considerably lower than the northern Rocky Mountains. Elevations range from 50 to 300 feet above the hill bases. The gentle slopes ascent at an average rate of 9 to 17 percent, except in ravines and washes where gradients up to 47 percent may be found. At their bases, the hills merge with alluvial slopes. The line of demarcation is usually very noticeable as the gentle gradient of the slope contrasts with the steep, rolling hill topography.

Alluvial Slopes

Alluvial slopes are formed by debris washed down from the mountains by rain and melting snow (see Figure 4-1). In general, this type of terrain exhibits a long, gentle, relatively smooth slope from its base to the foot of the mountains. The portion of the slope immediately adjacent to the mountains usually consists of a band of coarse gravel some 200 to 500 yards in width. Occasionally, the zone of coarse gravel has been cut by many V-shaped draining channels and presents a firm, well-drained surface. Merging with and, in many cases, burying the coarse gravel is the fine silty clay material which makes up the greater part of the alluvial slope surface. In some places, this zone of fine material extends up to the base of the mountains with little or no intervening zone of gravel.

Alluvial slopes have between 2 and 9 percent gradients with the steepest slopes near the mountains. The degree of the slopes becomes progressively less away from the mountains until it becomes imperceptible where the alluvial slopes merge with the silty clay flats. Small hummocks of northern desert shrub of 5 to 12 inches in height are numerous and closely spaced on the slope area; however, the vegetation is appreciably denser and taller than that found on the silty clay flats. Drainage channels become smaller and more vertically walled on the lower alluvial slopes.

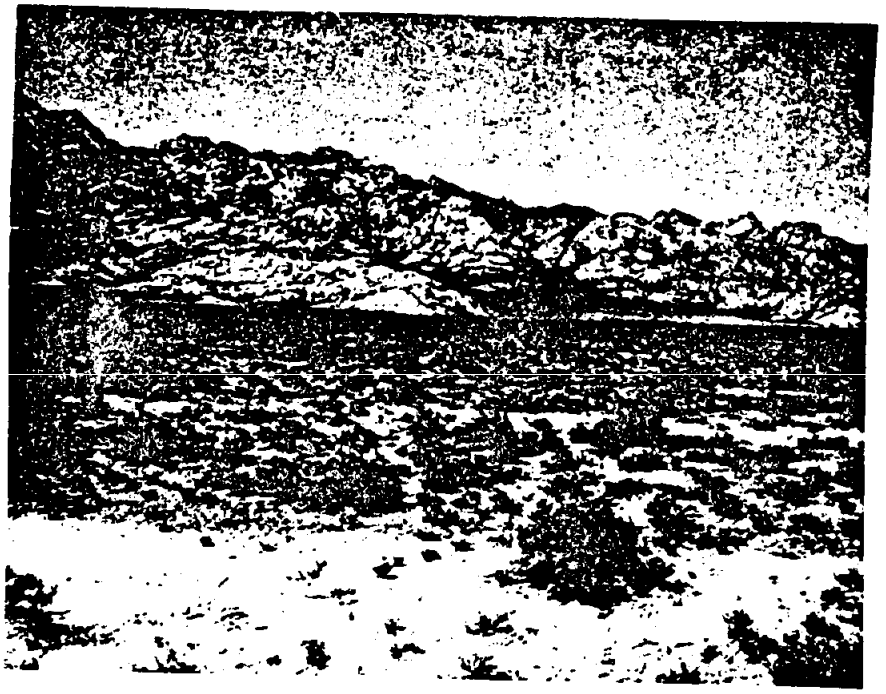


Figure 4-1. Alluvial slopes in Rush Valley with Greasewood and Shadscale in foreground.

SURFACE WATER

Rush Valley is a part of the great basin and is in the area of internal drainage that once was occupied by Lake Bonneville. The drainage basin of the valley is about 40 miles long (north-south orientation) but the valley itself is only about 30 miles long and at its maximum width is about 17 miles.

The northern and central interior of Rush Valley was shaped during Pleistocene time when the valley was occupied by a shallow, sheltered arm of Lake Bonneville. The highest recognized shoreline of Lake Bonneville is illustrated in Figure 4-2. The ancient shoreline of this lake approximates the present elevation contour of 5,200 feet. Below this level alluvial material was formed into lacustrine features most of which are low and weakly expressed. The only prominent example is Stockton Bar, located at the gap that formed the inlet to this arm of Lake Bonneville. This gap apparently drained Rush Valley in pre-Lake Bonneville time, but now the bar closes the drainage basin and no surface stream flow leaves it.

Nearly all surface drainage in the Valley is directed northward to Rush Lake. On the west side of the valley, most of the drainage is well defined from the mountains to the lake, but to the southeast, the upland stream channels end at the string of playas south and southeast of TEAD-S. Although the playas are connected and slope toward Faust Creek, it is probable that the playas discharge water to the creek only when they receive large amounts of runoff.

These playas are located south and southeast of the CAMDS site at TEAD-S. The playas, by their nature, are wide, long, flat areas which can dissipate large amounts of runoff water (as from a cloud burst). Because of the dissipative capacity of these playas, the potential for flooding at the CAMDS site, due to excessive railfall in the valley, is low. Figure 4-3 illustrates the normal precipitation for the Rush Valley. The Tooele South Area, location of the CAMDS site, receives an annual precipitation of 10 inches, as can be seen from this figure.

GROUND WATER

Ground water in Rush Valley is received entirely from snowmelt and rainfall within the drainage basin, mostly above altitudes of 5,500-6,000 feet. The quantity of precipitation at these altitudes generally exceeds the immediate losses from evapotranspiration, so that some water infiltrates the consolidated rocks in the mountains and some collects in streams that discharge onto the adjoining alluvial fans and aprons. The main areas of evapotranspiration are illustrated in Figure 4-4. Of the stream water that reaches the fans, much is lost to evapotranspiration before and after infiltration; some adds to the soil moisture, and part percolates to the water table. The average annual rate of recharge from precipitation on lands below 5,500-6,000 feet is small, because the amount of precipitation is generally

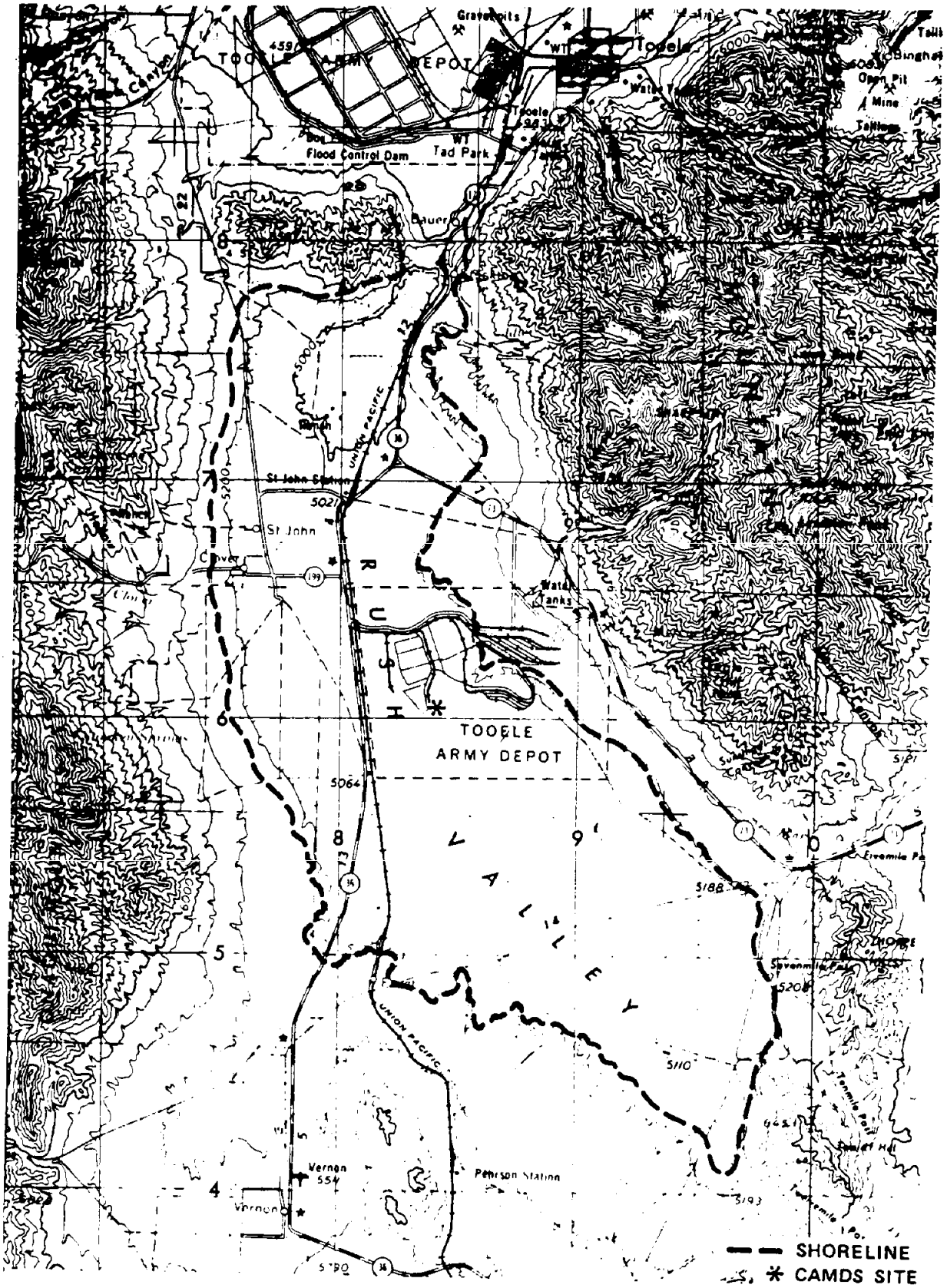


FIGURE 4-2. Shoreline of Lake Bonneville

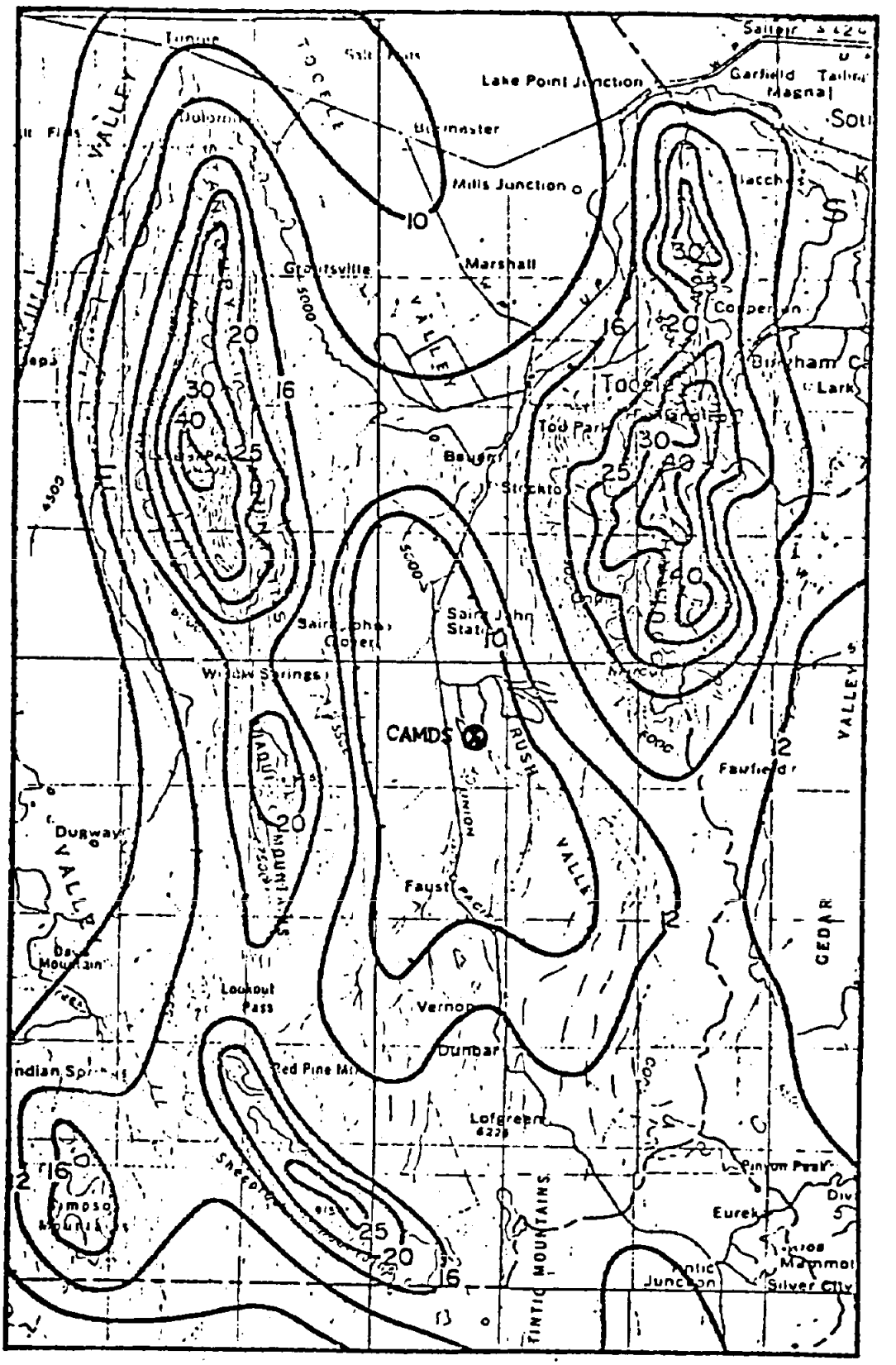


Figure 4-3. Normal annual precipitation in inches for Rush Valley and vicinity[23]

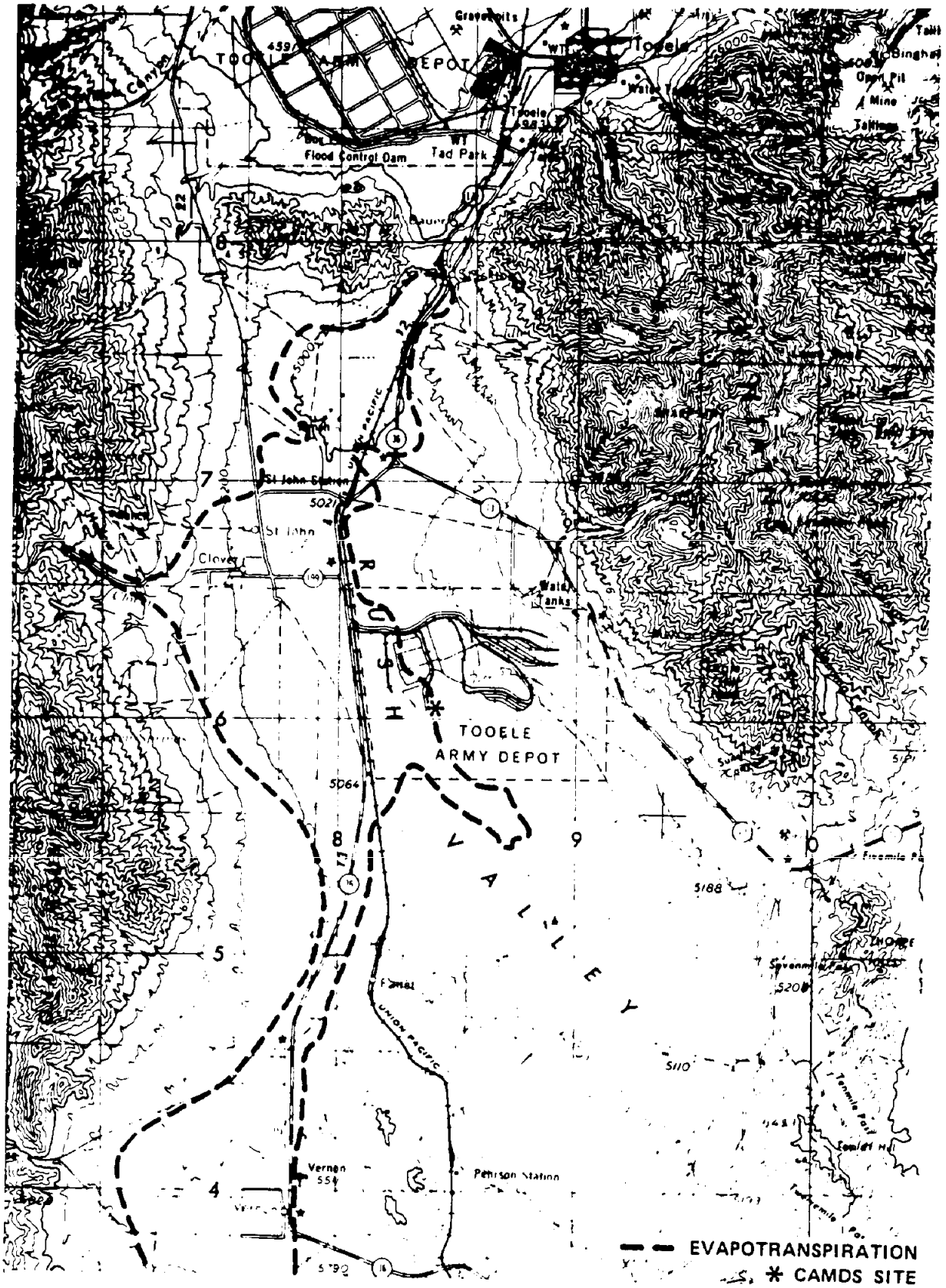


FIGURE 4-4. Main Areas of Evapotranspiration

small and most of the moisture is held by the soil structure and subsequently, discharged by evapotranspiration. The estimate of the average annual ground water recharge to Rush Valley is about 34,000 acre-feet, slightly more than 6% of the estimated 550,000 acre-feet of precipitation that falls on the drainable basin. A ground water contour map is shown in Figure 4-5.

In the central part of the valley, ground water generally occurs under unconfined conditions in a veneer of younger alluvium that overlies the older fine-grained unconsolidated rocks. The deep, fine-grained, unconsolidated rocks yield little water to wells but contain some water under artesian pressure. The water table on the west central side of the valley slopes steeply eastward, indicating that the older unconsolidated rocks control the depth to water along the western slope of the valley by preventing downward percolation from the veneer of younger surficial rocks. On the east central side of the valley, the alluvial fan below the mouth of Ophir Canyon contains unconfined ground water, as in the TEAD-S wells. Confined (artesian) conditions are probable in the lower slopes of the fan and in the fine-grained aquifer that are beneath the valley lowlands (at the location of the CAMDS site). Water levels in and near Faust Creek are shallow, but the depth to water increases eastward. The east edge of the valley from five mile pass to twelve mile pass apparently is a discharge area where ground water drains from the fine-grained aquifers into limestone of paleozoic age.

Ground water moves from the recharge areas at higher altitudes to discharge areas at lower altitudes. In Rush Valley, ground water moves toward two different discharge areas (Rush Lake and the Five Mile-Twelve Mile Pass Area), as indicated by the above discussion. A ground water flow divide crosses the central part of the valley in a northeasterly - southwesterly direction under the CAMDS site, as illustrated in Figure 4-5.

Both north and south of the ground water divide beneath the valley lowlands, the slope of the ground water table is very gentle. Although water is undoubtedly moving, the quantity of the water is small because the aquifers have low permeability. For example, it is estimated that approximately 5,000 acre-feet per year of ground water is discharged from the valley in the vicinity of five mile - twelve mile pass. The discharge area is 15 miles wide, and the saturated thickness of the aquifer is 400 feet. The flow velocity computed from these data indicates a ground water movement of approximately 7 feet per year in this area.

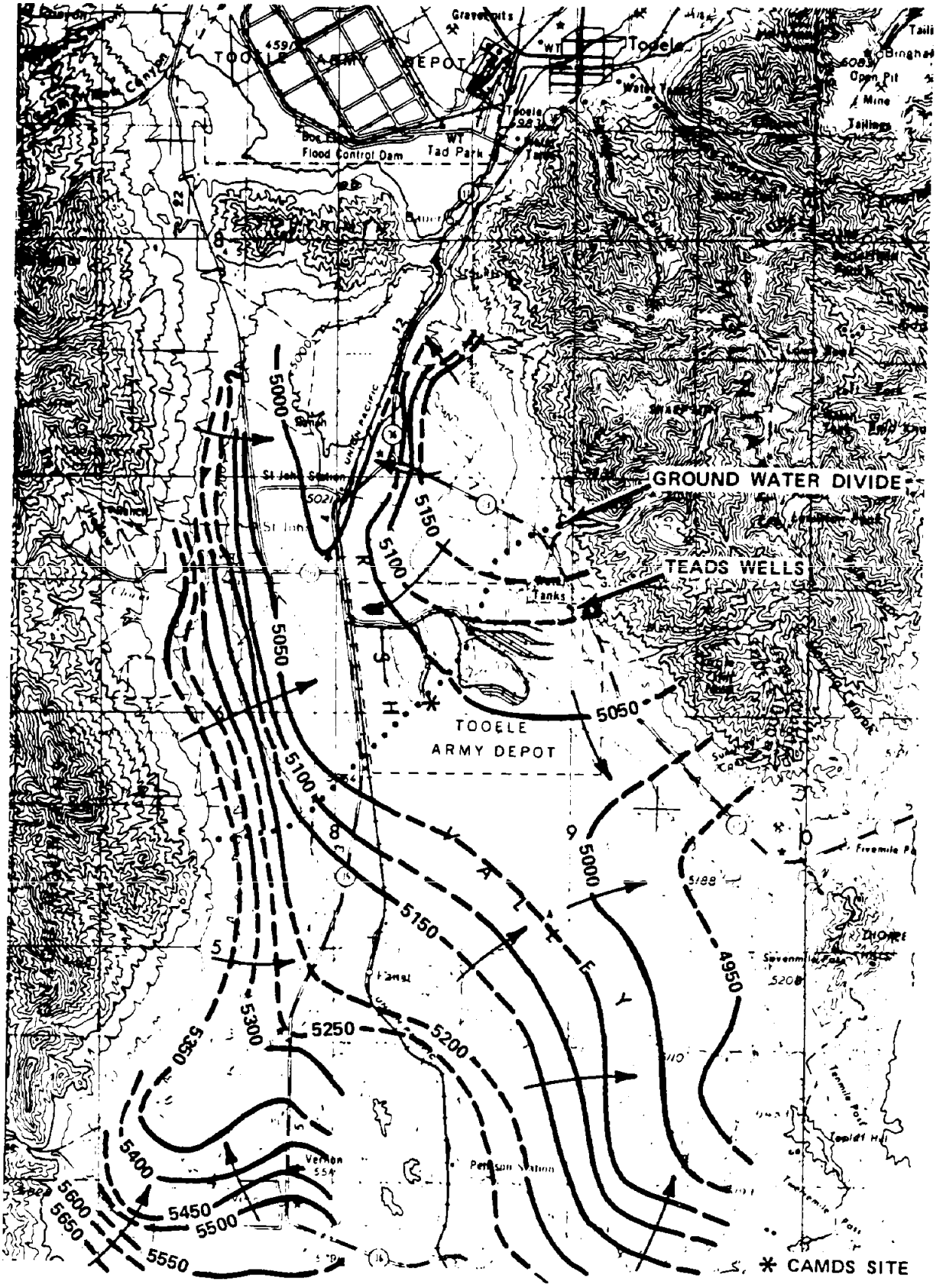


FIGURE 4-5. Ground Water Contour Map with Flow Arrows and Ground Water Divide.

GROUND WATER QUALITY

Past measured concentrations of dissolved solids in water sampled from wells and springs in the valley ranged from 238 to 2,180 PPM. Most of the water, however, contained less than 1,000 PPM of dissolved solids. The principle constituents of most water in the valley were calcium and bicarbonate, but magnesium sodium and chloride predominated in some waters.

Significant changes in the chemical quality of ground water have been recorded during the period 1948-1963 at the two wells on TEAD-S. These fluctuations were recorded for concentration of dissolved solids and the relative concentrations of individual constituents. The relative concentrations of chloride increased with increased concentrations of dissolved solids, whereas the relative concentrations of bicarbonate decreased and sulfate plus nitrate and magnesium remained approximately the same. The relative concentrations of sodium plus potassium increased with increased concentrations of dissolved solids up to 460 PPM, then decreased as the dissolved solids increased from 460 to 497 PPM; whereas, the relative concentrations of calcium decreased with increased concentrations of dissolved solids up to 460 PPM, then increased as the dissolved solids increased from 460 to 497 PPM.

These wells are finished in the Ophir Creek alluvial fan and are within a quarter of a mile of Ophir Creek. The average concentration of dissolved solids in water from the wells is about 240 PPM greater than that in water from Ophir Creek, but the relative proportion of dissolved constituents in water from the wells is very similar to that in water from the creek. The records of chemical quality of water for Ophir Creek (1964-65) do not extend over as long a period as those for the wells; however, there is a possibility that the chemical composition of water from Ophir Creek varies enough to account directly or indirectly for the fluctuation of the chemical composition of water from the wells. During the period February - June, in contrast to the period August - November, the lower concentration of dissolved solids in water from the two wells (Figure 4-6) apparently results from greater recharge from Ophir Creek and reduced withdrawal of water from the wells. During the period August - November, recharge from Ophir Creek decreases and water levels in the wells generally decline due to increased pumping. This results in larger contributions of water stored deeper in the unconsolidated rocks. The deeper water apparently contains more dissolved solids than the water that is contributed directly from Ophir Creek.

In general, most of the water used for irrigation in Rush Valley is generally of suitable chemical quality for agricultural use. Much of the water contains one or more constituents in concentrations that exceed the maximum limits for drinking water standards recommended for the US Public Health Service.

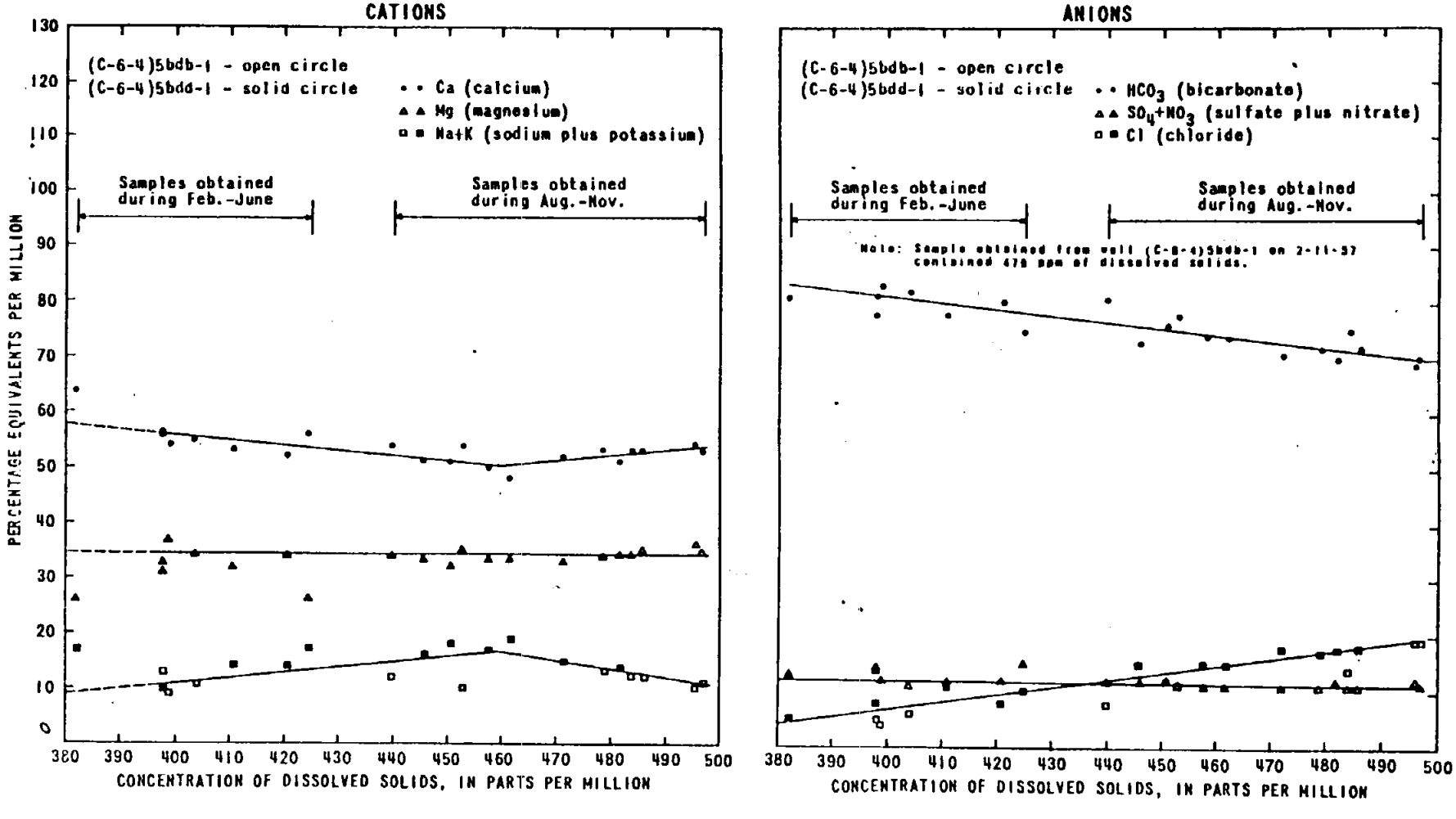


Figure 4-6- Fluctuation of the chemical composition of water from TEAD-S wells [(C-6-4)5bdb-1 and (C-6-4)5bdd-1] during the period 1948-63.

Vegetation in the Rush Valley

The vegetation of the Rush Valley area has a generally uniform aspect, with only three major plant types represented. Although there is a variety of species present, their general size, color, and aggregate appearance are remarkably similar. The types of formations that have been distinguished are Juniper Woodland, Northern Desert Shrub, and Salt Desert Shrub.

Juniper Woodland

The only tree growths in the area are of a type that has been termed "Desert Woodland", Pygmy Conifers", and "Pinon Juniper Woodland". The last name has been modified here simply to Juniper, since Pinon Pine does not accompany the Juniper in this area as it does in many parts of the West (see Figure 4-7). Juniper trees are locally known as "Cedars" and are abundant on the lower foothills and mountain slopes surrounding Rush Valley. The height of a Juniper seldon exceeds 25 feet. Sagebrush, which favors well-drained soils, is frequently present with the Junipers on the lower slopes.

Northern Desert Shrub

The most extensive type of vegetation in the Rush Valley area is the Northern Desert Shrub. There are a number of different species, but the most common species in Shadscale (see Figure 4-8). This plant is found both in pure growths and in combinations with such species as Gray Molly, Greasewood, Budsage, Nuttals Salt Bush, Sagebrush, Winterfat, and Horsebrush. Because this type of vegetation can tolerate a certain amount of alkalinity in the soil, it occupies the lower alluvial slopes.

Shadscale generally occupies lower ground than does sagebrush, into which it merges on the lower slopes where the soil is less alkaline. Shadscale reaches its greatest density on the lower alluvial slopes where it covers 30 percent of the ground area but appears from a distance to form continuous vegetation cover. However, in the more extensive shadscale areas, the average height of the plants is about 18 inches and the color is a dull light brown, very similar to that of the ground. On the lower, more alkaline soil, the plants are smaller and are distributed more sparsely. On such areas as these, the Shadscale is frequently associated with Gray Molly and Greasewood.

Gray Molly and Greasewood are rarely found in the desert mountains where thin soils and numerous rock outcrops are unfavorable to plant growth. The largest of the northern desert shrubs is the Greasewood which grows to a height of 18 to 48 inches, has a vegetative crown from 18 to 40 inches, and is spaced at intervals from 3 to 20 feet (see Figure 4-9). Gray Molly ranges in height from 3 to 12 inches, has a crown from 4 to 14 inches, and is spaced at 2 to 4 feet intervals (see Figure 4-10).

In the sagebrush areas, the vegetation takes on a grayish appearance and may attain a height of 3 to 4 feet. Sagebrush is gradually being crowded out by the Juniper as the latter extends its range down the mountain slopes.

Figure 4-7. Juniper Woodland.

Figure 4-8. Shadscale - Gray Molly.

Figure 4-9. Greasewood.

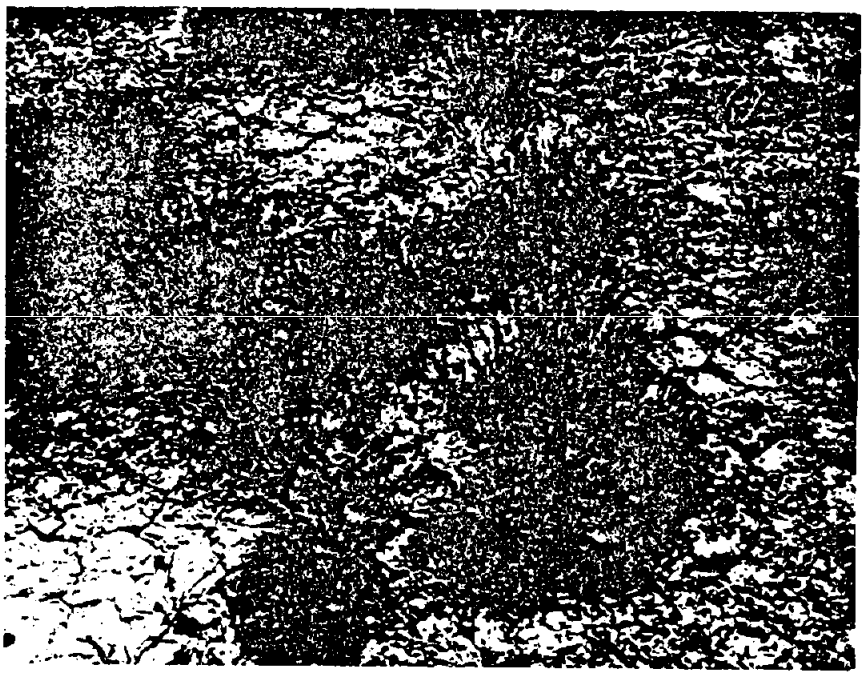


Figure 4-10. Gray Molly.

FAUNAL AND FLORAL RESOURCES

Tooele Army Depot (TEAD), like all arid and semi-arid desert ecosystems, possesses a father complex, yet delicate, system of animal and plant life living in strong interdependence; each individually conditioned by evolution to the rigors of its dry environment.

Mammals

Much of what is known about the mammalian life of TEAD has been compiled from studies of surrounding and/or adjacent regions and from ecological surveys conducted in the South Area from 1973-1975 (Dugway report is in preparation).

Appendix I presents a complete list of mammals which are thought to occur on TEAD (Potential) and notes those species actually seen within its boundaries (Observed).

Birds

Because of their migratory behavior, this is probably the most difficult group to characterize as far as occurrence in any given geographic area.

The sparseness of nesting sites limits the number of resident species of birds, but other factors, such as open ground and rodent habitat provides excellent conditions for both resident and seasonal predatory species.

Many of the variety of trees planted at TEAD are suitable as nesting sites for a number of passerines.

Appendix II lists the avifauna of TEAD in three categories: (1) Resident Species, (2) Migrant Species, (3) Species Actually Observed.

Reptiles

Available data lists five species of lizards and three species of snakes as common to the Rush Valley area.

Appendix III lists the common reptilian species likely to occur at TEAD.

Amphibians

There is only one amphibian species which might inhabit TEAD. This is the Spadefoot Toad (Scaphiopus hammondii intermontanus). It relies upon standing water for its breeding cycle and is, thereby, quite limited within the boundaries of TEAD.

Fish

There are no known species of free-living fish within the boundaries of TEAD.

Rare and Endangered Species

None.* Research will continue in this area.

*United States List of Endangered Fauna, US Department of the Interior, USBSFW, May 1974.

Baseline Studies of Flora at the South Area

These studies were conducted in the fall of 1973 and summer of 1974 by Dugway Proving Ground ecology personnel, to establish baseline value for predominant floral species in the vicinity of the chemical demilitarization and storage sites in the South Area of Tooele Army Depot.

Eight vegetative transects 200 feet long each were permanently established in a site characteristic of the flora in that area and marked with com T-posts, three at the demilitarization site, three at Area 2, and two at Area 10. All vegetative transites are indicated on the map (Figure 4-11) by VT and the number of the transect.

The following plants were seen in the study area:

Species	Common Name
Atriplex confertilfolia	Shadscale
Atriplex gardneri	Salt bush
Sitanion hystrix	Squirreltail
Artemesia tridentata	Sagebrush
Bromus tectorum	Cheatgrass
Halogeton glomeratus	Halogeton
Lepidium peafoliatum	Peppergrass
Chysothammus nauseosus	Rabbitbrush
Brassica L.	Mustard
Agropyron L.	Blue grass

The plant habitat of the three areas (i.e., demilitarization site, Area 2, and Area 10) may be characterized in terms of percent plant cover, as follows:

Site	Shrubs	Grasses	Other
Demil Site	Shadscale - 9.4%	Bunchgrass - 3.9%	
	Salt bush - 6.9%	Peppergrass - 0.9%	
	Rabbitbrush - 0.03%	Cheatgrass - 0.1%	

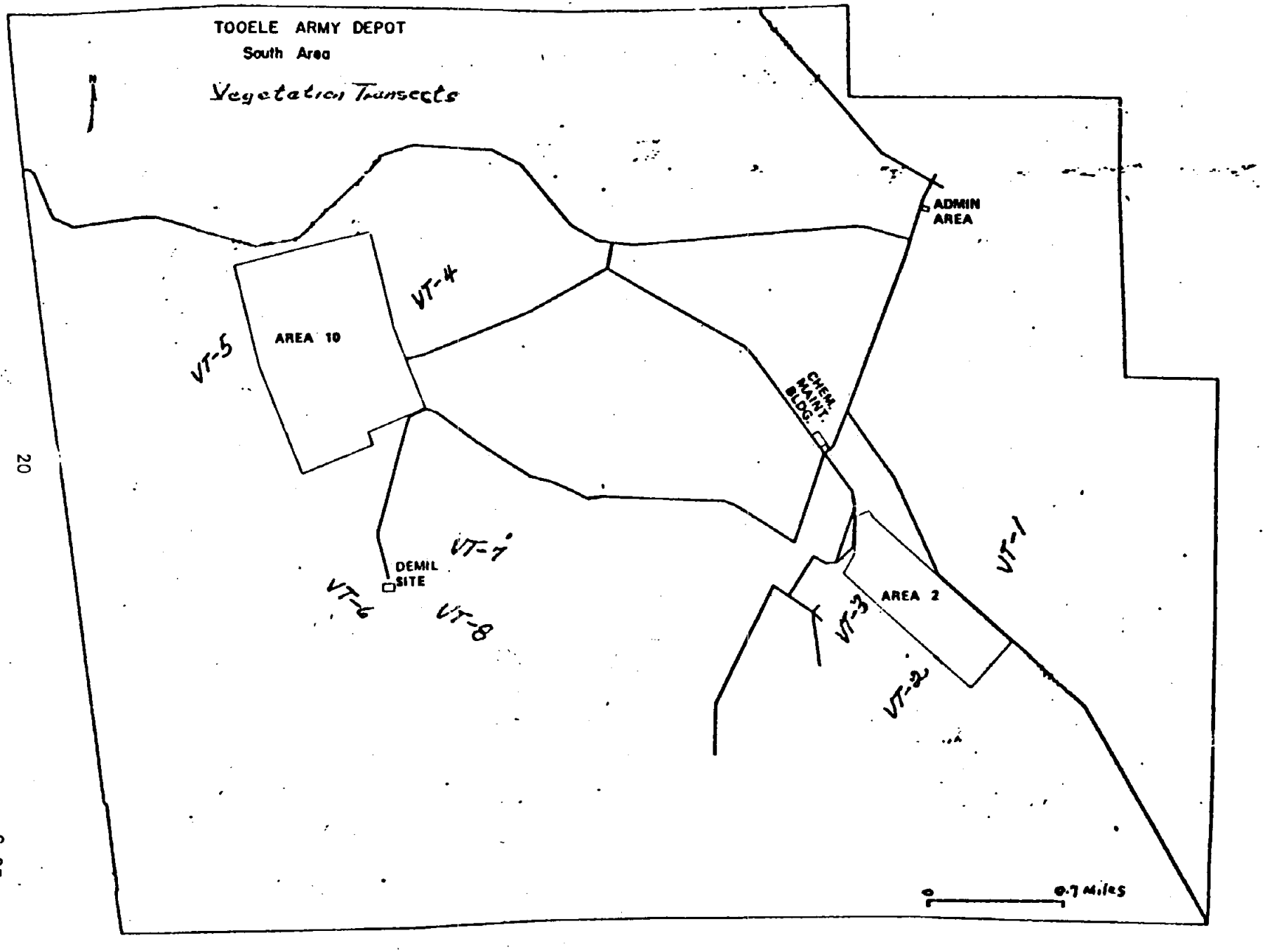
Site	Shrubs	Grasses	Other
Area 2	Shadscale - 10.9%	Mustard - 0.4%	Halogeton - 2.4%
	Sagebrush - 2.3%		
	Rabbitbrush - 1.8%		
Area 10	Shadscale - 6.1%	Cheatgrass - 4.8%	Halogeton - 0.1%
	Salt bush - 3.8%	Bunchgrass - 1.8%	
	Sagebrush - 3.4%	Peppergrass - 1.1%	
		Blue grass - 0.1%	

Habitats

Aquatic - there are no year-round streams or bodies of water on Tooele Army Depot which would qualify as aquatic habitat.

Terrestrial - Tooele Army Depot is located botanically within the Upper Sonoran Zone. The fauna, like the flora of this region, is adapted to semi-arid conditions, most animals being nocturnal and subterrestrial in habit. The generalized absence of native trees somewhat limits the variety of birds found here.

Rare of Endangered Habitats - there are no known areas of rare or endangered habit present on Tooele Army Depot.


TOOELE ARMY DEPOT
South Area
Vegetation Transects
N
ADMIN AREA
VT-4
VT-5
AREA 10
CHEM. MAINT. BLDG.
VT-7
DEMIL SITE
VT-6
VT-8
VT-1
AREA 2
VT-3
VT-2
0
0.7 Miles

APPENDIX I

POTENTIAL MAMMALS OF TOOELE ARMY DEPOT SOUTH AREA

Species Name	Common Name	Observed
Sorex merriami	Merriam's Shrew	
S. vagrans	Vagrant Shrew	
S. palustris	Water Shrew	
Myotis lncifugus	Little Brown Myotis	
M. evotis	Long-Eared Myotis	
M. volans	Long-Legged Myotis	
M. subulatus	Small-Footed Myotis	
Lasionycteris notivagans	Silver-Haired Bat	
Pipistrellus hesperus	Western Pipistrelle	
Eptesicus fuscus	Big Brown Bat	
Nycteris cinereus	Hoary Bat	X
Plecotus townsendii	Townsend's Big-Eared Bat	
Euderma maculatum	Spotted Bat	
Antrozous pallidus	Pallid Bat	
Tadarida braziliensis	Brazilian Free-Tailed Bat	
Lepus californicus	Black-Tailed Jackrabbit	X
Sylvilagus nuttallii	Nuttallis Cottontail	
S. audubonii	Desert Cottontail	X
Marmota flaviventris	Yellow-Bellied Marmot	
Spermophilis townsendii	Townsend's Ground Squirrel	
S. variegatus	Rock Squirrel	
S. lateralis	Golden-Mantled Ground Squirrel	

APPENDIX I, POTENTIAL MAMMALS OF TOOELE ARMY DEPOT SOUTH AREA (CONT)

Species Name	Common Name	Observed
Ammospermophilus leucurus	Antelope Ground Squirrel	X
Eutamias minimus	Least Chipmunk	X
E. umbrinus	Uinta Chipmunk	
E. dorsalis	Cliff Chipmunk	
Thomomys talpoides	Northern Pocket Gopher	
T. umbrinus	Southern Pocket Gopher	
Perognathus longimembris	Little Pocket Mouse	
P. formdsus	Long-Tailed Pocket Mouse	X
P. parvus	Great-Basin Pocket Mouse	
Microdipodops megacephalus	Dark Kangaroo Mouse	
Dipodomys ordii	Ord's Kangaroo Rat	X
D. Microps	Chisel-Toothed Kangaroo Rat	
Reithrodontomys megalotis	Western Harvest Mouse	
Peromyscus crinitus	Canyon Mouse	
P. maniculatus	Deer Mouse	X
P. True	Pinyon Mouse	
Onychomys leucogaster	Northern Grasshopper Mouse	X
Neotoma lepida	Desert Wood Rat	
N. cinerea	Bushy-Tailed Wood Rat	
Lagurus curtatus	Sagebrush Vole	
Microtus pennsylvanicus	Meadow Vole	
M. montanus	Mountain Vole	X
M. longicandus	Long-Tailed Vole	

APPENDIX I, POTENTIAL MAMMALS OF TOOELE ARMY DEPOT SOUTH AREA (CONT)

Species Name	Common Name	Observed
Rattus norvegicus	Norway Rat	
Mus musculus	House Mouse	
Zapus princeps	Western Jumping Mouse	
Erthizon dorsatum	Porcupine	X
Canis latrans	Coyote	X
Vulpes macrotis	Kit Fox	X
Uroycon cinereoargenteus	Gray Fox	
Bassariscus astutus	Ring-Tail	
Procyon lotor	Raccoon	
Mustela erminea	Ermine	
M. frenata	Long-Tailed Weasel	X
Taxidea taxus	Badger	X
Mephitis mephitis	Striped Skunk	X
Spilogale putorius	Spotted Skunk	
Lynx rufus	Bobcat	
Felis concolor	Mountain Lion	
Obocoileus hemionus	Mule Deer	
Antilocapra americana	Pronghorn	

APPENDIX II

POTENTIAL AVIAN SPECIES AT TOOELE ARMY DEPOT

Generic Name	Common Name	Observed*
Migrant Species		
Aguila chrysaetos	Golden Eagle	X
Circus cyaneus	Marsh Hawk	X
Tachycineta thalassina	Violet- reen Swallow	
Riparia riparia	Bark Swallow	
Petrochelidon pyrrhonata	Cliff Swallow	
Vermivora celata	Orange-Crowned Warbler	
Dendroica petechia	Yellow Warbler	
D. auduboni	Audubon's Warbler	
Molothrus ater	Brown-Headed Cowbird	
Piranga ludoviciana	Western Tanager	
Spinus tristis	American Goldfinch	
Junco hyemalis	Slate-Colored Junco	
J. oreganus	Oregon Junco	
Spizella breweri	Brewer's Sparrow	
Zonotrichia leucophorys	White-Crowned Sparrow	
Melospiza lincolnii	Lincoln's Sparrow	
Buteo lagopus	Rough-Legged Hawk	X
Haliaeetus leucocephalus	Bald Eagle	X
Bombycilla garrula	Bohemian Waxwing	
B. cedrorum	Cedar Waxwin	
Hesperiphona vespertina	Evening Grosbeak	

*South Area

APPENDIX II, POTENTIAL AVIAN SPECIES AT TOOELE ARMY DEPOT (CONT)

Generic Name	Common Name	Observed*
Selosphorus rufus	Rufous Hummingbird	
S. platycercus	Broad-Tailed	
Regulus satrapa	Golden-Crowned Kinglet	
Vireo solitarius	Solitary Vireo	
Resident Species		
Cathartes aura	Turkey Vulture	X
Accipiter striatus	Sharp-Shinned Hawk	X
A. cooperii	Cooper's Hawk	
Buteo swainsoni	Swainson's Hawk	X
B. jamaicensis	Red-Tailed Hawk	X
B. regalis	Ferruginous Hawk	X
Falco sparverius	Sparrow Hawk	X
F. mexicanus	Prairie Falcon	X
Zenaidura macroura	Mourning Dove	X
Chordeiles minor	Common Nighthawk	X
Tyrannus verticalis	Western Kingbird	
Myiarchus cinerascens	Ash-Throated Flycatcher	
Sayornis saya	Say's Phoebe	
Hirundo rustica	Barn Swallow	X
Troglodytes aedon	House Wren	
Mimus polyglottos	Mockingbird	
Dreosloptes monatus	Sage Thrasher	

*South Area

APPENDIX II, POTENTIAL AVIAN SPECIES AT TOOELE ARMY DEPOT (CONT)

Generic Name	Common Name	Observed*
Turdus migratorius	Robin	X
Chlorura chlorura	Green-Tailed Towhee	
Pooecetes gramineus	Vesper Sparrow	X
Chondestes grammacus	Lark Sparrow	
Centrocercus urophasianus	Sage Grouse	
Phasianus colchicus	Ring-Necked Pheasant	X
Alectoris graeca	Chuckar	
Bubo virginianus	Great Horned Owl	X
Speotyto cunicularia	Burrowing Owl	X
Asio otus	Long-Eared Owl	
A. flammeus	Short-Eared Owl	
Colaptes cafer	Red-Shafted Flicker	
Eremophila alpestris	Horned Lark	X
Aphelocoma coerulescens	Scrub Jay	X
Pica pica	Black-Billed Magpie	
Corvus corax	Common Raven	X
Cymnorhinus cyancocephala	Pinon Jay	X
Lanius ludovicianus	Loggerhead Shrike	X
Sturnus vulgaris	Starling	X
Passer domesticns	House Sparrow	X
Sturnella neglecta	Western Meadowlark	X
Agelaius phoeniceus	Red-Winged Blackbird	

*South Area

APPENDIX II, POTENTIAL AVIAN SPECIES AT TOOELE ARMY DEPOT (CONT)

Generic Name	Common Name	Observed*
Euphagus cyanocephalus	Brewer's Blackbird	
Spizella passerina	Chipping Sparrow	

*South Area

APPENDIX III

POTENTIAL REPTILES OF TOOELE ARMY DEPOT SOUTH AREA

Scientific Name	Common Name	Observed
Gambelia wislizenii	Leopard Lizard	
Scebporus graciosus	Safebrush Lizard	
Uta stansburiana	Northern Ground Uta	
Phrynosoma platyrhinos	Desert Horned Lizard	
Cnemidophorus tesselatus	Tesselated Race-Runner	
Coluber taeniatus	Western Striped Racer	
Pitouphis catenifer	Great Basin Gopher Snake	X
Crotalus viridis	Breat Basin Rattlesnake	

REFERENCES

1. Technical Publication #23, Hydrologic Reconnaissance of Rush Valley, Tooele County, Utah, State of Utah, Department of Natural Resources, 1969.

2. Seismic Risk Studies in the United States. US Department of Commerce, Environmental Science Services Administration Coast and Geodetic Survey, January 1969.

APPENDIX D

HISTORICAL SUMMARY OF

INDUSTRIAL ACTIVITIES AT TEAD

Historical Summary of Industrial Activities at TEAD (page 1 of 5)

Building No.	Activity	Potential Contaminant
8	Filling fire extinguishers	Sulfuric acid
10	Maintenance and repair of electronic equipment	Petroleum products
TL-23	Spray painting	Paint pigments
T-31	Removing base plates from bombs	Explosive dusts
S-33	Metal stripping, cleaning, anodizing and electro-plating, spray painting	Chromic acid, phosphoric acid, hydrochloric acid, paint pigments
T-37	Laundering clothes	Explosives residue
T-45	Washing out bombs, pel-letizing explosives	TNT, RDX, Composition B
51	Unpacking and repacking rockets; demilitarizing 120mm cartridges, inserting boosters, disassembling hand grenades	Greases and oils, double-base propellant, black powder, nitroglycerin, Pettman cement, TNT
52	Filling and recharging Edison batteries	Sodium hydroxide
	Lead burning on battery terminals	Lead dust
S-108 (South)	Processing M12 (machine gun) links, welding	Hydrochloric, chromic, and phosphoric acids; metal dust
T-118	Vehicle maintenance, welding	Petroleum products, metal dust
119	Repair and maintenance of vehicles	Petroleum products

Historical Summary of Industrial Activities at TEAD (page 2 of 5)

Building No.	Activity	Potential Contaminant
501	Mixing and dispensing insecticides	Lindane, chlordane, malathion, and DDT
507	Filling and changing lead-acid batteries	Sulfuric acid
510	Vehicle maintenance and repair; welding	Petroleum products, cresolic acid; metal dust
511	Vapor-degreasing welding	Trichloroethylene, trichloroethane, metal dust
513	Spray painting	Paint pigments
518	Mixing and dispensing pesticides	Pesticides
520	Spray painting, linking and packing 50 cal. ammunition, pulling apart small arms ammunition, demilitarizing small arms ammunition, popping primers	Paint pigments, greases and oils, propellant, tracer and incendiary powder, lead dust
532	Mixing and dispensing pesticides	Pesticides including dieldrin, diazinon, warfarin, malathion, DDT, and chlordane
533	Spray painting, cleaning metals, welding	Paint pigments, phosphoric acid, metal dust
539	Burning tracers from butts, lead recovery from tips and butts, burning of fuses, primers and small arms ammunition	Antimony, lead dust
S-541 (South)	CW agent surveillance, drinking water analysis	Small quantities of CW agents, perchloric acid
553	Packing and cleaning CN hand grenades including paint containers; paint stripping metal parts	CN, greases, oil, paint pigments, caustic, phosphoric acid

Historical Summary of Industrial Activities at TEAD (page 3 of 5)

Building No.	Activity	Potential Contaminant
554 (South)	Demilitarization of M14 incendiary cluster bombs	Tetryl, thermate mix, cadmium dust, first fire mix
T-600 (South Area)	Renovation of M4-A2 smoke pots, M15 WP grenades, and H-filled rounds	Smoke producing mixture, paint pigments; WP, possibly chromic acid
600 (North Area)	Spray painting, missile disassembly	Paint pigments, petroleum products
	Metal stripping, cleaning, anodizing and electroplating	Phenols, cresols, phosphoric acid, chormic acid, sodium hydroxide, fluorides, nitric acid, plating wastes
	Vapor-degreasing	Trichloroethylene, trichloroethane
602	Vehicle parts lubrication and preservation	Petroleum products
603	Tire repair and recapping	Rubber dusts, vulcanizing cement
604	Spray painting, vapor-degreasing; welding	Paint pigments; trichloroethylene; metal dust
607	Welding	Metal dust
608	Machining metals, welding	Oils, coolants, and greases; metal dust
609	Metal stripping, cleaning, anodizing and electroplating	Caustic, hydrochloric acid, phosphoric acid, plating wastes
	Radiation repair, including brazing	Metal dust
611	Vapor degreasing, cleaning and lubricating parts	Trichloroethylene petroleum products
612	Spray painting	Paint pigments
	Sanding of painted surface	Paint and metal dusts

Historical Summary of Industrial Activities at TEAD (page 4 of 5)

Building No.	Activity	Potential Contaminant
613	Welding	Metal dust
614	Etching and rinsing plates	Trichloroethylene
615	Metal stripping, cleaning, anodizing and electroplating	Zinc compounds, phosphoric acid, sodium hydroxide, phenols, cresols, chromic acid, nitric acid, fluorides, oil, plating wastes
	Vapor-degreasing	Trichloroethylene, trichloroethane
	Spray painting	Paint pigments
619	Vehicular rebuilding, tuning and testing; welding; vapor degreasing; cleaning gunbores; machining and grinding; filling in dents	Metal fumes; trichloroethylene; petroleum products; stoddard solvent; metal dusts; benzoyl peroxide; phtalate esters
	Spray painting	Paint pigments
620	Metal stripping, cleaning, anodizing and electroplating	Alkali, phosphoric acid, chromic acid
	Vapor-degreasing	Trichloroethylene, trichloroethene
637	Arc, acetylene and inserting-gas welding; machining and grinding; assembling transmissions; small arms repair	Metal dusts
	Metal stripping, cleaning, anodizing and electroplating	Cresylic acid, sodium hydroxide, chromic acid, plating wastes
	Vapor-degreasing	Trichloroethylene, trichloroethane
	Spray painting; axle rebuilding	Paint pigments; petroleum products

Historical Summary of Industrial Activities at TEAD (page 5 of 5)

Building No.	Activity	Potential Contaminant
644	Acetylene cutting	Metal dust
647	Foam-in-place packaging, woodworking	Toluene diisocyanate
1701 (Hill)	Vapor-degreasing, welding	Trichlorethylene, trichloroethane, metal dust
	Spray painting	Paint pigments
1711 (Hill)	Spray painting	Paint pigments
1723 (Hill)	Metal stripping, cleaning, anodizing and electro-plating	Cadmium and cyanide salts, hydrochloric chromic and nitric acids
	Vapor-degreasing	Trichloroethylene, Trichloroethane
1919 (Hill)	Spray painting, repairing and reconditioning landing gear	Paint pigments, petroleum products

APPENDIX E

INDUSTRIAL CHEMICAL INVENTORY

FOR TOOELE ARMY DEPOT

DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGCEN.

REFERENCE OR OFFICE SYMBOL	SUBJECT
SDSTE-ADS	Industrial Chemical Inventory

79THRU: Dir f/Services
TO: C, Depot Facilities Div

FROM C, Safety Division

DATE 31 August 1977 CMT 1
M.Wilson/gsp/2713

1. Reference your DF, dated 18 May 1976, subject as above.

2. In order to maintain the TEAD Industrial Chemical Inventory, it is necessary for us to obtain updated information annually.

3. The inclosed information was listed in referenced DF as being used in the Depot Facilities Sections.

4. Request that Inclosure 1 be reviewed and the necessary additions and/or deletions be made and returned to Safety Division NLT 30 September 1977. Please include manufacturer, when known, and approximate rate of use of each.

1 Incl
as

MARK M. ZAUGG
Chief, Safety Division

DSTE-SEF (31 Aug 77)

THRU Director for Services

FROM Ch, Dep Fac Div

DATE 29 Sep 77 CMT 2
Mrs. Long/mt/2334

TO C, Safety Division

As requested by paragraph 4 of CMT 1, inclosure has been reviewed by foremen of shops listed. Current list is forwarded showing annual rate of use and manufacturer, if known.

1 Incl
as

JAMES B. STRICKLAND
Chief, Depot Facilities Division

METALWORKING SECTION- BLDG 502

Federal Stock Number	Nomenclature & Manufacturer	Requirement
3439-00-255-4577	Flux, Brazo (Union Carbide, NY, NY)	2 cans every 6 months
3439-00-255-9935	Flux, Soldering (Burnley Battery & Mfg. Corp. No. East PA 16428)	2 cans every 6 months
6850-00-230-3981	Acid, Muratic 31-45 (Wasatch Chemical, 1979 S. 7th E. SLC 84160)	1 gallon every 6 months
6850-00-973-9091	Liquid Tool, Du-ol (Borden Inc., NY, NY 10017)	5 cans every 6 months
7510-00-J06-0073	Ink, Toolmakers (Crown Industrial Product Co. Hebron, IL 60034)	10 cans every 6 months

PREVENTIVE MAINTENANCE & PAINT SECTION - BLDG 514

Federal Stock Number	Nomenclature	Requirement
8010-00-160-5787	Thinner, Dope and Lacquer	60 gallons per year
8010-00-160-5788	Thinner, Dope and Lacquer	50 " " "
8010-00-160-5794	Thinner, Syn., Resin Enamel	500 " " "
8010-00-160-5796	Liquid, Paint, Drier, Type I	5 " " "
8010-00-290-6983	Lacquer, White (Type I) 17875	10 cases of 24 cans per year
8010-00-527-2045	Enamel, Yellow (Orange) 13538	10 gallons per year
8010-00-721-9483	Lacquer, Green, #14110, Type I	5 cases per year
8010-00-721-9743	Lacquer, Red, #11105, Type I	15 cases " "
8010-00-721-9752	Lacquer, Brass, #17043	10 " " "
8030-00-244-1033	Oil, Neat's Foot, Type I, Sulfonated	2 gallons per year
8010-00-721-9751	Lacquer, Type II, Acrylic, Silver, #17178	20 cases per year
8010-00-721-9742	Lacquer, Brown, #10075	4 cases per year
8010-00-079-3752	Enamel, Gloss, Black, #17038	25 cases per year
8010-00-281-2729	Pigment-in-oil, Burnt Sienna	1 quart per year
8010-00-281-3649	Pigment-in-oil, Yellow, Light	1 quart per year
8010-00-X89-5223	Universal Tinting Color, Burnt Umber	1 " " "
8010-	Universal Tinting Color, Thalo Blue	1 " " "
8010-	Universal Tinting Color, Medium Yellow	1 " " "
8010-00-X89-5221	Universal Tinting Color, Raw Umber	1 " " "
8010-	Universal Tinting Color, Perm. Green Dk	1 " " "
8010-00-X89-5225	Universal Tinting Color, Cream Green	1 " " "
8010-00-X89-5226	Universal Tinting Color, Prussion Blue	1 " " "
8010-00-X89-5227	Universal Tinting Color, Yellow, Ochre	1 " " "
8010-00-X89-5224	Universal Tinting Color, Yellow, Lt.	1 " " "
8030-00-838-7789	Corrosion Preventive Compound, Aerosol	1 case " "
8010-00-144-9702	Enamel, Screen Process, White	2 gallons per year
8010-	Enamel, Screen Process, Blue	2 " " "
8010-AAA-0009	Enamel, Screen Process, Black	10 " " "
8010-	Enamel, Screen Process, Bright Red	10 " " "
8010-00-X89-2787	Enamel, Screen Process, Medium Green	2 " " "
8010-	Enamel, Screen Process, Emerald Green	2 " " "

PREVENTIVE MAINTENANCE & PAINT SECTION - BLDG 514

Federal Stock Number	Nomenclature	Requirement
8010-00-664-7078	Paint, Blackboard Coating, Black	5 gallons per year
8010-00-664-7081	Paint, Blackboard Coating, Green	5 " " "
8010-00-286-7759	Enamel, Alkyd, Gloss, Bright Blue, #15123	2 " " "
8010-00-X88-4635	Bulletin Posted, Light Blue	4 quarts per year
8010-00-X77-8766	Bulletin Posted, Bright Red	5 gallons per year
8010-00-X77-3469	Bulletin Posted, Black	5 " " "
8010-00-X77-3486	Bulletin Posted, Medium Green	2 " " "
8010-00-X77-8767	Bulletin Posted, Lemon Yellow	2 " " "
8010-00-X77-8750	Bulletin Posted, Chrome Yellow	2 " " "
8010-00-X88-0089	Bulletin Posted, White	1 gallon per year
8010-00-X88-4638	Bulletin Posted, Brilliant Blue	3 gallons per year
8010-00-X77-8768	Bulletin Posted, Enamel, Dark Green	1 gallon per year
8010-00-X77-8748	Bulletin Posted, Medium Yellow	2 quarts per year
8010-	Bulletin Posted, Medium Orange	2 " " "
8010-00-527-3201	Enamel, Alkyd, Gloss, Orange, #12246	5 gallons per year
8010-	Enamel, Bulletin, Emerald Green	2 quarts per year
8010-00-X88-0640	Enamel, Bulletin, Dark Green	2 gallons per year
8010-00-166-1669	Varnish, Spar.	5 gallons per year
8010-	Varnish, Flat	10 " " "
8010-00-281-2071	Stain, Oil, Wood	5 " " "
8010-	Enamel, Gloss, Brown, #10219	10 " " "
8010-	Enamel, Super Yacht., Brown, #10075	25 " " "
8010-	Enamel, Semi-gloss, Ultra-gold	30 " " "
8010-00-290-4054	Paint, Oil, Semi-gloss, Cream, #13613	50 " " "
8010-00-779-9474	Paint, Flat Int., Ivory,#37855	30 " " "
8010-00-901-8040	Paint, Int., Semi-Gloss,#27855	300 " " "
8010-00-579-8195	Paint, Enamel, Int., Semi-Gloss, White, #27855	150 " " "
8010-00-X88-6937	Paint, Enamel, Semi-Gloss,Ivory, #27855	125 gallons per year
8010-00-X89-3293	Paint, Enamel, Semi-gloss, Oderless & Lead Free, Ivory,#27855	100 " " "
8010-00-527-3197	Paint, Enamel, Semi-gloss, Light Green, #24533	50 gallons per year
8010-00-X77-7630	Sealer, Clear Wood, McCloskey	10 " " "
8010-00-225-7964	Paint, Enamel, Int., Semi-gloss, White, #27778	75 " " "
	Stain, Wood, Clear, Penetrating, McCloskey Tungseal	30 " " "
8010-00-X88-5920	Stain, Olympic, Linseed Oil Base, Curry, Solid Color	25 " " "
8010-DNN-0191	Sealer, Hardener for concrete, Polyurethane	
	Protectine Coating, Int. Exterior, Derusto, PC-75, Pale Gray	

PREVENTIVE MAINTENANCE & PAINT SECTION - BLDG 514

Federal Stock Number	Nomenclature	Requirement
8010-00-597-3636	Varnish, Oil, Flat Brush or Spray	10 gallons per year
8010-00-063-7880	Paint, Fire Retardent, Ivory, #37855	10 " " "
8010-00-664-5678	Enamel, Aluminum	200 " " "
8010-00-664-6302	Primer, Coating & Surfacer, Synethic, White, #37875	25 " " "
8010-00-297-0585	Enamel, Semi-gloss, Alkyd, Yellow, #23538	150 " " "
8010-00-577-4522	Paint, Ext. Oil, Gray, #26251	150 " " "
8010-00-577-4523	Paint, Oil, Ext. Gray, #26251	100 " " "
8010-00-900-2938	Paint, Traffic, White	250 " " "
8010-00-900-3648	Paint, Traffic, Yellow	325 " " "
8010-00-X88-0643	Enamel, Bulletin, Black	2 " " "

ELECTRICAL SECTION - BLDG S-502

Federal Stock Number	Nomenclature	Annual Requirements
5970-00-548-9520	Insulating Varnish, Elec	1 Gal
6850-00-835-0484	Deicing - Defroster	5 Pints
6850-00-508-0076	Penetrating Fluid	6 Pints
8010-00-680-0143	Lacquer, Cellolose-Nitrate	12 Cans
8010-00-141-2950	Lacquer, Acrylic, Type 2	12 Cans
8010-00-721-9753	Lacquer, Nitrocellulose Type I	12 Cans
8010-00-721-9751	Lacquer, Acrylic, Type 2	12 Cans
8010-00-141-2951	Lacquer, Nitrocellulose, Type I	12 Cans
8010-00-721-9746	Lacquer, Nitrocellulose, Type I	12 Cans
8010-00-584-3148	Lacquer, Nitrocellulose, Type I	12 Cans
8010-00-721-9743	Lacquer, Nitrocellulose, Type II	12 Cans
8010-00-721-9750	Lacquer, Nitrocellulose, Type I	12 Cans
8010-00-160-5787	Thinner, Cellulose Nitrate	1 Gal
8010-00-721-9746	Lacquer, Type 1	12 Cans
8010-00-290-6984	Lacquer, Type 1	12 Cans
6505-00-153-8219	Glycerin, USP	1 Gal
6850-00-597-9765	Solvent, Cleaning Compound	10 Gallon

ELECTRICAL SECTION - BLDG 521

9150-00-X88-4860	Oil, Insulating, REF: Pet. Hydroc	50 Gal

ELECTRICAL SECTION - BLDG 594 (Equipment Room)

6830-00-106-1659	Freon 22	200 Lbs
6830-00-X77-4392	Freon 12	100 Lbs
7930-00-X77-3428	Cleaner, Neutra-Solv	25 Gal
9150-00-GNN-1873	Oil, Refrigeration, Suniso L3-5	3 Gal

ELECTRICAL SECTION - BLDG 597

6850-00-135-2878	Anti-Freeze Ethylene Glycol	100 Gal
9150-00-X77-5282	Oil, Lube, Sunlube, MIL-L-2104B	20 Gal
9150-00-AAA-0063	Oil, Lube, Synthetic Monsanto Chem.	15 Gal

ELECTRICAL SECTION - BLDG 619 (Air Comp., etc.)

9150-00-X77-3774	Oil, Lube, American Oil, No. 31	300 Gal

ELECTRICAL SECTION - BLDG 691

9150-00-X77-1639	Oil, Lube, AmOco 100, SAE 40	100 Gal

SANITATION SECTION - BLDG S-502

Federal Stock Number	Nomenclature	Annual Requirements
6810-00-AAA-0191	Sanfax, Mighty Pack #222	5 Gal per year
6810-00-X89-1821	Acid, Sulfuric	10 Gal per year
6850-00-224-8730	Antifreeze	55 Gal per year
6850-00-230-3981	Acid, Muratic	5 Gal per year
9130-00-264-6218	Gasoline, Auto	200 Gal per year

SANITATION SECTION - BLDGS 531; 682 AND 699

6830-00-169-0786	Chlorine, Tech Bulk Gas	4,350 Lbs per year

STEAMFITTING SECTION - BLDG S-606

Federal Stock Number	Nomenclature	Annual Requirements
3439-00-255-4577	Flux, Brazo	4 EA
3439-00-255-9935	Flux, Soldering	6 EA
6810-00-AAA-0169	Mercury	10 LBS
6810-00-GNN-1081	Acid, Hydrochloric	5 Gal
6850-00-224-8730	Antifreeze	55 Gal
6850-00-230-3981	Acid, Muratic, 31-45	10 Gal
6850-00-508-0076	Fluid, Penetrating (Duol)	48 EA
6850-00-823-7861	Fluid, Starting, Int. Comb. Eng.	6 EA
6850-00-973-9091	Liquid Tool, Du-Ol	48 EA
6830-00-264-6755	Acetylene, Tech	6 Cyl
6850-00-AAA-0018	Solvent, Windshield Washer, Anco	24 EA
8010-00-584-3148	Lacquer, Orange (Type I), 12197	24 Cans
8010-00-584-3149	Lacquer, OD Spray (Type I), 4064	24 Cans
8010-00-584-3150	Lacquer, White (Type I) 37875	24 Cans
8010-00-598-5455	Lacquer, Blue, 15193	24 Cans
8010-00-598-5936	Enamel, OD Type II (Pressurized) X24087	24 Cans
8010-00-616-4009	Paint, OD, Heat Resisting, X34087	24 Cans
8010-00-616-9182	Primer, Coating, Green, Zinc Chromate, 134151	24 Cans
8010-00-721-9483	Lacquer, Green, #14110, Type I	24 Cans
8010-00-721-9743	Lacquer, Red, #11105, Type I	24 Cans
8010-00-721-9744	Lacquer, Yellow, #13538, Type I	24 Cans
8010-00-721-9752	Lacquer, Brass, #17043	24 Cans
8010-00-721-9754	Lacquer, type I, Gray, #26134	48 Cans
8010-00-815-2692	Paint, Heat Resisting, Silicone Alum	96 Cans
8010-00-087-1953	Thinner	10 Gal
8040-00-B06-0696	Adhesive, 3-M Super Weatherstrip, P#8001	24 Cans
9120-00-268-3360	Acetylene	72 Cyl
9130-00-264-6218	Gasoline, Auto	5,000 Gal
9140-00-242-6748	Kerosene	10 Gal
9150-00-X77-3772	Oil, Cutting, Rigid Nu-Clear Thread	20 Gal
9150-00-190-0905	Grease, Auto & Artillery	10 Gal
9150-00-281-2007	Oil, Lube, Gen Purpose (Sub: 9150-00-281-2060)	10 Gal

HEATING SECTION - BLDG 606

Federal Stock Number	Nomenclature	Requirement
6810-AAA-0169	Mercury (Used in all heating systems)	5 pounds per year
6810-00-205-6786	Alcohol, Ethyl (Ethanol)	55 gallons per year
6850-00-224-8730	Antifreeze	10 Gallons
6850-00-230-3981	Acid, Muratic 31-45	10 gallons per year
6850-00-264-9039	Solvent, Dry Cleaning (Stoddard) Type I	50 gallons per year
6850-00-508-0076	Fluid, Penetrating (Duol)	24 cans per year
6850-00-823-7861	Fluid, Starting, Int.Comb. Engines	48 cans per year
6850-00-973-9091	Liquid Tool, Duol	48 cans per year
7510-00-161-4237	Ink, Stamp Pad, Black, Type I	1 quart per year
6850-AAA-0018	Solvent, Windshield Washer, Anco	24 cans per year
6850-00-X77-3150	Cleaner, Take-Off All Purpose	48 cans per year
8010-00-584-3148	Lacquer, Orange (Type I) 12197	24 cans per year
8010-00-584-3149	Lacquer, OD Spray (Type I) 4064	10 cans per year
8010-00-584-3150	Lacquer, White (Type I) 37875	24 cans per year
8010-00-597-8234	Remover, Paint (Type III)	12 cans per year
8010-00-598-5455	Lacquer, Blue, 15193	24 cans per year
8010-00-616-9182	Primer, Coating, Green, Zinc Chromate, 134151	12 cans per year
8010-00-721-9483	Lacquer, Green, #14110, Type I	24 cans per year
8010-00-721-9743	Lacquer, Red, #11105, Type I	24 cans per year
8010-00-721-9744	Lacquer, Yellow, #13538, Type I	48 cans per year
8010-00-721-9752	Lacquer, Brass, #17043	12 cans per year
8010-00-721-9754	Lacquer, Gray, #26134, Type I	48 cans " "
8010-00-815-2692	Paint, Heat Resisting, Silicone Alum	48 cans " "
8010-00-852-9033	Enamel, Alkyd, Yellow, #13538	24 cans " "
8010-00-899-8875	Enamel, Green, #24272	24 " " "
8030-AAA-0023	Compound Tannin, Quebacco	4-Ton per year
8030-00-244-1033	Oil, Neat's Foot, Type I Sulfonated	2 gallons per year
8010-00-514-1861	Primer, Zinc Chromate Yellow	12 cans per year
8010-00-582-5382	Lacquer, Black (Type I) 37038	48 cans per year
8040-00-B06-0596	Adhesive, 3M Super Weatherstrip, P#8001	12 rolls per year
9130-00-264-6218	Gasoline, Auto	7,200 gallons per year
9150-00-190-0905	Grease, Aut & Artillery	120 pounds per year
9150-00-281-2007	Oil, Lube, General Purpose (Substitute for 9150-00-281-2060)	72 gallons per year
6810-00-949-8331	Sodium Hexametaphosphate	2 tons per year
6810-00-174-6581	Sodium, Hyroxide	2 tons per year
0810-00-559-9888	Morpholine	55 gallons per year
6810-00-530-4695	Cyclohexamine	55 gallons per year
	Morpholine, Union Carbide Corp., Chemicals & Plastics, NY, NY 10017	

ENGINEERING BRANCH - BLDG 501

Federal Stock Number	Nomenclature	Requirement
6810-00-X88-2824	Anhydrous Ammonia	300 pounds per year

METALWORKING SECTION - BLDG 502

Federal Stock Number	Nomenclature
3439-00-255-4577	Flux, Brazo
3439-00-255-9935	Flux, Soldering
6850-00-230-3981	Acid, Muratic 31-45
6850-00-973-9091	Liquid Tool, Du-ol
7510-00-J06-0073	Ink, Toolmakers

ENGINEERING BRANCH - BLDG 501

6810-00-X88-2824	Anhydrous Ammonia

PREVENTIVE MAINTENANCE & PAINT SECTION - BLDG 514

Federal Stock Number	Nomenclature
8010-00-160-5787	Thinner, Dope and Lacquer
8010-00-160-5788	Thinner, Dope and Lacquer
8010-00-160-5794	Thinner, Syn., Resin Enamel
8010-00-160-5796	Liquid, Paint, Drier, Type I
8010-00-290-6983	Lacquer, White (Type I) 17875
8010-00-527-2045	Enamel, Yellow (Orange) 13538
8010-00-721-9483	Lacquer, Green, #14110, Type I
8010-00-721-9743	Lacquer, Red, #11105, Type I
8010-00-721-9752	Lacquer, Brass, #17043
8030-00-244-1033	Oil, Neat's Foot, Type I, Sulfonated
8010-00-721-9751	Lacquer, Type II, Acrylic, Silver, #17178
8010-00-721-9742	Lacquer, Brown, #10075
8010-00-079-3752	Enamel, Gloss, Black, #17038
8010-00-281-2729	Pigment-in-oil, Burnt Sienna
8010-00-281-3649	Pigment-in-oil, Yellow, Light
8010-00-X89-5223	Universal Tinting Color, Burnt Umber
8010-	Universal Tinting Color, Thalo Blue
8010-	Universal Tinting Color, Medium Yellow
8010-00-X89-5221	Universal Tinting Color, Raw Umber
8010-	Universal Tinting Color, Perm. Green Dk
8010-	Universal Tinting Color, Thalo Blue
8010-00-X89-5225	Universal Tinting Color, Cream Green
8010-00-X89-5226	Universal Tinting Color, Prussion Blue
8010-00-X89-5227	Universal Tinting Color, Yellow, Ochre
8010-00-X89-5224	Universal Tinting Color, Yellow, Lt.
8030-00-838-7789	Corrosion Preventive Compound, Aerosol
8010-00-144-9702	Enamel, Screen Process, White
8010-	Enamel, Screen Process, Blue
8010-AAA-0009	Enamel, Screen Process, Black
8010-	Enamel, Screen Process, Bright Red
8010-00-X89-2787	Enamel, Screen Process, Medium Green
8010-	Enamel, Screen Process, Emerald Green
8010-00-664-7078	Paint, Blackboard Coating, Black
8010-00-664-7081	Paint, Blackboard Coating, Green
8010-00-286-7759	Enamel, Alkyd, Gloss, Bright Blue, #15123
8010-BBB-0077	Enamel, Gloss, Purple Magenta #17142
8010-00-X88-4635	Bulletin Posted, Light Blue
8010-00-X89-5421	Bulletin Posted, Medium Gold
8010-00-X77-8766	Bulletin Posted, Bright Red
8010-00-X77-3469	Bulletin Posted, Black
8010-00-X77-3486	Bulletin Posted, Medium Green
8010-00-X77-8767	Bulletin Posted, Lemon Yellow
8010-00-X77-8750	Bulletin Posted, Chrome Yellow
8010-00-X88-0089	Bulletin Posted, White
8010-00-X88-4638	Bulletin Posted, Brilliant Blue

PREVENTIVE MAINTENANCE & PAINT SECTION - BLDG 514 (Continued)

Federal Stock Number	Nomenclature
8010-00-X77-8768	Bulletin Posted, Enamel, Dark Green
8010-00-X77-8748	Bulletin Posted, Medium Yellow
8010-	Bulletin Posted, Medium Orange
8010-	Bulletin Posted, Fluorescent Green
8010-00-527-3201	Enamel, Alkyd, Gloss, Orange, #12246
8010-	Ink, Screen Printing, Black, #3905
8010-	Enamel, Bulletin, Emerald Green
8010-00-X88-0644	Enamel, Bulletin, White
8010-00-X88-0641	Enamel, Bulletin, Medium Green
8010-00-X88-0640	Enamel, Bulletin, Dark Green
8010-00-X88-0642	Enamel, Bulletin, Light Green
8010-00-X88-2672	Enamel, Bulletin, Bright Red
8010-00-166-1669	Varnish, Spar.
8010-	Varnish, Flat
8010-00-281-2071	Stain, Oil, Wood
8010-	Enamel, Gloss, Brown, #10219
8010-	Enamel, Super Yacht., Brown, #10075
8010-	Enamel, Semi-gloss, Ultra-gold
8010-00-290-4054	Paint, Oil, Semi-gloss, Cream, #13613
8010-00-779-9474	Paint, Flat Int., Ivory, #37855
8010-00-901-8040	Paint, Int., Semi-Gloss, #27855
8010-00-579-8195	Paint, Enamel, Int., Semi-Gloss, White, #27855
8010-00-X88-6937	Paint, Enamel, Semi-gloss, Ivory, #27855
8010-00-X89-3293	Paint, Enamel, Semi-gloss, Odorless & Lead free, Ivory, #27855
8010-00-255-7964	Paint, Enamel, Semi-gloss, Ivory, #27855
8010-00-527-3197	Paint, Enamel, Semi-gloss, Light Green, #24533
8010-00-X77-7630	Sealer, Clear Wood, McCloskey
8010-00-225-7964	Paint, Enamel, Int., Semi-gloss, White, #27778
	Stain, Wood, Clear, Penetrating, McCloskey Tungseal
8010-00-X88-5920	Stain, Olympic, Linseed Oil Base, Curry, Solid Color
8010-DNN-0191	Sealer, Hardener for concrete, Polyurethane
	Protectine Coating, Int. Exterior, Derusto, PC-75, Pale Gray
8010-00-597-3636	Varnish, Oil, Flat Brush or Spray
8010-00-063-7880	Paint, Fire Retardent, Ivory, #37855
8010-00-664-5678	Enamel, Aluminum
	Symko Acoustic Coater, Symkoloid
8010-00-664-6302	Primer, Coating and Surfacer, Synthetic, White, #37875
8010-00-297-0585	Enamel, Semi-gloss, Alkyd, Yellow, #23538
8010-00-292-2292	Enamel, Alkyd-gloss, Olive Drab, #14087
8010-00-297-2122	Enamel, Lustreless, Quick-Drying, Styrene Alkyd
8010-00-680-2810	Lacquer, Camouflage, Black, #27038

PREVENTIVE MAINTENANCE & PAINT SECTION - BLDG 514 (Continued)

Federal Stock Number	Nomenclature
8010-00-577-4522	Paint, Ext. Oil, Gray, #26251
8010-00-577-4523	Paint, Oil, Ext. Gray, #26251
8010-00-900-2938	Paint, Traffic, White
8010-00-900-3648	Paint, Traffic, Yellow
8010-00-X88-0643	Enamel, Bulletin, Black

ELECTRICAL SECTION - BLDG 502

Federal Stock Number	Nomenclature
5970-00-548-9520	Insulating Varnish, Electrical
6850-00-835-0484	Deicing - Defroster
6850-00-508-0076	Penetrating Fluid
8010-00-680-0143	Lacquer, Cellolose-Nitrate
8010-00-141-2950	Lacquer, Acrylic, Type 2
8010-00-721-9753	Lacquer, Nitrocellulose Type I
8010-00-721-9751	Lacquer, Acrylic, Type 2
8010-00-141-2951	Lacquer, Nitrocellulose, Type I
8010-00-721-9746	Lacquer, Nitrocellulose, Type I
8010-00-584-3148	Lacquer, Nitrocellulose, Type I
8010-00-721-9743	Lacquer, Nitrocellulose, Type II
8010-00-721-9750	Lacquer
8010-00-160-5787	Thinner, Cellulose Nitrate

ELECTRICAL SECTION - BLDG 521

9150-00-X88-4860	Oil, Insulating, REF: Pet. Hydroc.

ELECTRICAL SECTION - BLDG 594 (Equip Room)

6830-00-106-1659	Freon 22
6830-00-X77-4392	Freon 12
7930-00-X77-3428	Cleaner, Neutra-Solv
9150-GNN-1873	Oil, Refrigeration, Suniso L3-5

ELECTRICAL SECTION - BLDG 597

6850-00-135-2878	Anti-Freeze Ethylene Glycol
9150-00-X77-5282	Oil, Lube, Sunlube, MIL-L-2104B
9150-AAA-0063	Oil, Lube, Synthetic Monsanto Chem.

ELECTRICAL SECTION - BLDG 619 (Air Comp., etc.)

9150-00-X77-3774	Oil, Lube, American Oil, No. 31

ELECTRICAL SECTION - BLDG 691

9150-00-X77-1639	Oil, Lube, AmOco 100, SAE 40

STEAMFITTING SECTION - BLDG 606

Federal Stock Number	Nomenclature
3439-00-255-4577	Flux, Brazo
3439-00-255-9935	Flux, Soldering
6810-AAA-0169	Mercury
6810-GNN-1081	Acid, Hydrochloric
6850-00-224-8730	Antifreeze
6850-00-230-3981	Acid, Muratic, 31-45
6850-00-508-0076	Fluid, Penetrating (Duol)
6850-00-823-7861	Fluid, Starting, Int. Comb.Eng
6850-00-973-9091	Liquid Tool, Du-Ol
6830-00-264-6755	Acetylene, Tech
6850-AAA-0018	Solvent, Windshield Washer, Anco
8010-00-584-3148	Lacquer, Orange (Type I), 12197
8010-00-584-3149	Lacquer, OD Spray (Type I), 4064
8010-00-584-3150	Lacquer, White (Type I) 37875
8010-00-598-5455	Lacquer, Blue, 15193
8010-00-598-5936	Enamel, OD Type II (Pressurized) X24087
8010-00-616-4009	Paint, OD, Heat Resisting, X34087
8010-00-616-9182	Primer, Coating, Green, Zinc Chromate, 134151
8010-00-721-9483	Lacquer, Green, #14110, Type I
8010-00-721-9743	Lacquer, Red, #11105, Type I
8010-00-721-9744	Lacquer, Yellow, #13538, Type I
8010-00-721-9752	Lacquer, Brass, #17043
8010-00-721-9754	Lacquer, Type I, Gray, #26134
8010-00-815-2692	Paint, Heat Resisting, Silicone Alum
8010-00-087-1953	Thinner
8040-00-B06-0596	Adhexive, 3M Super Weatherstrip, P#8001
8120-00-268-3360	Acetylene
9130-00-264-6218	Gasoline, Auto
9140-00-242-6748	Kerosene
9150-00-X77-3772	Oil, Cutting, Rigid Nu-Clear Thread
9150-00-190-0905	Grease, Auto & Artillery
9150-00-281-2007	Oil, Lube, General Purpose (Substitute: 9150-00-281-2060)

SANITATION SECTION - BLDG 502

Federal Stock Number	Nomenclature
4935-00-724-3251	Flux, Soldering
6505-00-205-6513	Alcohol, Rubbing
6505-AAA-0019	Acid, Revision for phosphate
6810-AAA-0123	Acid, Sulfuric
6810-AAA-0177	Chloride, Stannous cone.
6810-AAA-0191	Sanfax, Mighty Pack #222
6810-00-X89-1827	Acid, Sulfuric
6810-00-X77-3115	Nalco 519
6850-00-224-8730	Antifreeze
6850-00-230-3981	Acid, Muratic
6850-00-508-0076	Fluid, Penetrating (Duol)
6850-AAA-0018	Solvent, Windshield Washer, Anco
6850-GNN-1774	Fluid, Silicone 703
9130-00-264-6218	Gasoline, Auto
9150-00-X77-3772	Oil, Rigid Nu-Clear Thread

SANITATION SECTION - BLDGS 531, 682 and 599

6830-00-169-0786	Chlorine, Tech Bulk Gas

HEATING SECTION - BLDG 606

Federal Stock Number	Nomenclature
6810-AAA-0169	Mercury (Used in all heating systems)
6810-00-205-6786	Alcohol, Ethyl (Ethanol)
6850-00-224-8730	Antifreeze
6850-00-230-3981	Acid, Muratic 31-45
6850-00-264-9039	Solvent, Dry Cleaning (Stoddard) Type I
6850-00-508-0076	Fluid, Penetrating (Duol)
6850-00-823-7861	Fluid, Starting, Int.Comb. Engines
6850-00-973-9091	Liquid Tool, Duol
7510-00-161-4237	Ink, Stamp Pad, Black, Type I
6850-AAA-0018	Solvent, Windshield Washer, Anco
6850-00-X77-3150	Cleaner, Take-Off, all purpose
8010-00-584-3148	Lacquer, Orange (Type I) 12197
8010-00-584-3149	Lacquer, OD Spray (Type I) 4064
8010-00-584-3150	Lacquer, White (Type I) 37875
8010-00-597-8234	Remover, Paint (Type III)
8010-00-598-5455	Lacquer, Blue, 15193
8010-00-616-9182	Primer, Coating, Green, Zinc Chromate, 134151
8010-00-721-9483	Lacquer, Green, #14110, Type I
8010-00-721-9743	Lacquer, Red, #11105, Type I
8010-00-721-9744	Lacquer, Yellow, #13538, Type I
8010-00-721-9752	Lacquer, Brass, #17043
8010-00-721-9754	Lacquer, Gray, #26134, Type I
8010-00-815-2692	Paint, Heat Resisting, Silicone Alum
8010-00-852-9033	Enamel, Alkyd, Yellow, #13538
8010-00-899-8875	Enamel, Green, #24272
8030-AAA-0023	Compound Tannin, Quebacco
8030-00-244-1033	Oil, Neat's Foot, Type I Sulfonated
8010-00-514-1861	Primer, Zinc Chromate Yellow
8010-00-582-5382	Lacquer, Black (Type I) 37038
8040-00-B06-0596	Adhesive, 3M Super Weatherstrip, P#8001
9130-00-264-6218	Gasoline, Auto
9150-00-190-0905	Grease, Auto & Artillery
9150-00-281-2007	Oil, Lube, General Purpose (Substitute for 9150-00-281-2060)
6810-00-949-8331	Solium Hexametaphosphate
6810-00-174-6581	Sodium, Hyroxide
0810-00-559-9888	Morpholine
6810-00-530-4695	Cyclohexamine
	Morpholine, Union Carbide Corp., Chemicals & Plastics, New York, N.Y. 10017

APPENDIX F

PESTICIDES AND HERBICIDES

AT TEAD

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division
DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO: Donald Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS[1]	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST (include life stage or stage of growth) c) PURPOSE (if crop protection, what crop?)	a) COMMON NAME b) FORMULATION c) % AI AE OR LB/GAL d) REGISTRATION NO (required)	a) FORM APPLIED (Dust, granule, emulsion, bait, solution, gas, etc.) b) USE STRENGTH (%) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD (Aerial, ground, aerosol, ULV, EC, Other) b) EQUIPMENT (type)	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION Specify (a) or (b) [1] Croplands, lakes, streams, food, human exposure, endangered species, other	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED/CERTIFIED PERSONNEL c) STATE AND LOCAL d) OTHER PESTICIDES TO BE APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. SOUTH AREA AREA #2 #10 B. Russian Thistle Halogetin Sun Flower Canadian Thistle C. Fire Hazard Security	Bromacil Hyvarx Bromacil-5 Bromo-3 Sec-Butyl- 6-Methylo- Racil Reg. No. 352-287	Suspension 80%	10 Lbs Per Acre	Hydraulic Sprayer	62 Acres Area #2 15 Acres Area #10	A. Apr-May B. Utah	None	A. None B. None C. None D. Yes E. None
A. SOUTH AREA AREA #2 #10 ADMIN AREA B. Sun Flower Halogetin Russian Thistle Canadian Thistle Sweet Clover C. Fire Hazard Security General Appearance	2,4-D. Low Volatile Ester 6-L Isooctylester of 2,4-D. Chlorophenoxy Acetate Acid Reg. No. 359-411-AA	Solution 84.8%	2 Qts. Per Acre	Hydraulic Sprayer	16 Acres Around Bldgs	A. May-June & July B. Utah	None	A. None B. None C. Yes D. Yes E. None

FWGPM FORM 1 (8/74)

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division
DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO: Don Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS[1]	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST (include life stage or stage of growth) c) PURPOSE (of control or other reason)	a) COMMON NAME b) FORMULATION c) % AI AE OR LB/GAL d) REGISTRATION NO (required)	a) FORM APPLIED (Dust granule emulsion, bait, solution, gas etc.) b) USE STRENGTH (%) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD (Aerial, ground, aerosol, LIVE) (Other) b) EQUIPMENT (type)	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION *Specify (a) or (b)* [1] *Croplands, lakes, streams, food, human exposure, endangered species, other*	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED/CERTIFIED PERSONNEL c) STATE AND LOCAL [illegible] d) OTHER PESTICIDES BE [illegible] APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. COMMON AREA B. Dandelion Clover Morning Glory C. Fire Hazard General Appearance	2,4-D Volatile Estergy Isooctyl Ester of 2,4-D. Chlorophenoxy Acetic Acid Reg. No. 359-411-AA	Solution 94.8%	2 Qts. Per Acre	Hydraulic Sprayer	26 Acres of Lawns	A. Apr-May-Jun B. Utah	None	A. None B. None C. Yes-Certified Pers. D. Yes-Monitoring E. None
A. RAILROAD-TEAD B. Sait, Grass Russian Thistle Sun Flower C. Fire Hazard General Appearance	Bromacil Hyvarx Bromacil 5 Brom 3 Sec Butyl-6 Methyluracil Reg. No. 352-287 Krovar I Bromacil 40% Divron 40%	Suspension 80%	10 Lbs Per Acre	Hydraulic Sprayer	30 Acres Railroad Track	A. Apr-May-Jun B. Utah	None	A. None B. None C. Yes-Certified Pers. D. Yes-Monitoring E. None

FWGPM FORM 1 (8/74)

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division
DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO: Donald Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS[1]	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST (include life stage or stage of growth) c) PURPOSE of crop protection, what crop?	a) COMMON NAME b) FORMULATION c) % AI AE OR LB/GAL d) REGISTRATION NO. (required)	a) FORM APPLIED (dust, granule, emulsion, bait, solution, gas, etc.) b) USE STRENGTH(S) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD (Aerial, ground, aerosol, ULV, etc.) b) EQUIPMENT (type)	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION *Specify (a) or (b)* [1] *Croplands, lakes, streams, food, human exposure, endangered species, other*	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED APPLICATOR PERSONNEL c) STATE AND LOCAL CERTIFICATION d) OTHER PESTICIDES BEING APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RETROGRADE, PER CONTRACT B. Russian Thistle Sand Bur Halogetin Sun Flower Sweet Clover C. Security Fire Hazard	Krovari Divron 40% Bromacil 40%	Suspensions 80%	10 Lbs Per Acre	Hydraulic Sprayer	40 Acres Storage Lots	A. Apr & May B. Utah	None	A. None B. 40 Acres on Contract to Grazing Lease C. Yes D. Yes E. None
A. MAINTENANCE AREA AS PER CONTRACT B. Halogetin Russian Thistle Sun Flower White Top C. Security Fire Hazard	Krovari Divron 40% Bromacil 40%	Suspensions 80%	10 Lbs Per Acre	Hydraulic Sprayer	58 Acres Storage Lots and Around Warehouses	A. Apr-May B. Utah	None	A. None B. 58 Acres on Contract to Grazing Lease C. Yes D. Yes E. None

FWGPM FORM 1 (8/74)

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division
DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO: Donald Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS[1]	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST (include life stage or stage of growth) c) PURPOSE (if crop protection, what crop?)	a) COMMON NAME b) FORMULATION c) % AI, AE, OR LB/GAL d) REGISTRATION NO (required)	a) FORM APPLIED (Dust, granule, emulsion, bait, solution, gas, etc.) b) USE STRENGTH (%) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD (Aerial, ground, aerosol, U.L.V., L.V., Other) b) EQUIPMENT (type)	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION Specify (a) or (b) [1] Croplands, lakes, streams, food, human exposure, endangered species, other	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED/CERTIFIED PERSONNEL c) STATE AND LOCAL COORDINATION d) OTHER PESTICIDES TO BE APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. SUPPLY AREA B. Halogetin Russian Thistle White Top Sun Flower Sweet Clover C. Fire Hazard General Appearance Security	Krovar I Divron 40% Bromacil 40%	Suspensions 80%	10 Lbs Per Acre	Hydraulic Sprayer	25 Acres Around Storage Warehouses	A. Apr May B. Utah	None	A. None B. None C. Yes D. Yes E. None
A. SUPPLY AREA B. Russian Thistle Sun Flower Canadian Thistle Halogetin C. Security Fire Hazard General Appearance	Bromacil 5 Bromo-3 Sec Butyl-6 Methyluracil Reg. No. 352-287	Suspensions 80%	10 Lbs Per Acre	Hydraulic Sprayer	8 Acres Around Storage Warehouses	A. Apr May B. Utah	None	A. None B. None C. Yes D. Yes E. None

FWGPM FORM 1 (8/74)

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division
DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO: Donald Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS[1]	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST *(include life stage or stage of growth)* c) PURPOSE *(If crop protection, what crop?)*	a) COMMON NAME b) FORMULATION c) % AI AE, OR LB/GAL d) REGISTRATION NO *(required)*	a) FORM APPLIED *(Dust, granule, emulsion, bait, solution, gas, etc.)* b) USE STRENGTH (%) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD *(Aerial, ground, aerosol, ULV, LV, Other)* b) EQUIPMENT *(type)*	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION *Specify (a) or (b)* [1] *Croplands, lakes, streams, food, human exposure, endangered species, other*	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED/CERTIFIED PERSONNEL c) STATE AND LOCAL CLEARANCE d) OTHER PESTICIDES BEING APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. MAINTENANCE AREAS B. Russian Thistle Halogetin Sand Bur White Top C. General Appearance Security Fire Hazard	Krovari Divron 40% Bromacil 40%	Suspensions 80%	10 Lbs Per Acre	Hydraulic Sprayer	5 Acres Test Facility 34 Acres Storage Lots and Warehouses	A. Apr May B. Utah	None	A. None B. None C. Yes D. Yes E. None
A. MAINTENANCE AREA B. White Top Halogetin Russian Thistle C. General Appearance Fire Hazard Security	Bromacil Hyvarx Bromacil 5 Bromo-3 Sec Butyl- 6-Methylor acil Reg. No. 352-287	Suspensions 80%	10 Lbs Per Acre	Hydraulic Sprayer	22 Acres Around Storage Lots and Office Bldgs	A. Apr May B. Utah	None	A. None B. None C. Yes D. Yes E. None

FWGPM FORM 1 (8/74)

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division
DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO: Donald Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS[1]	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST (include life stage or stage if general) c) PURPOSE (if crop protection, what crop?)	a) COMMON NAME b) FORMULATION c) % AI AE OR LB/GAL d) REGISTRATION NO (required)	a) FORM APPLIED (Dust, granule, emulsion, bait, solution, gas, etc.) b) USE STRENGTH (%) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD (Aerial, ground, aerosol, U.L.V., Other) b) EQUIPMENT (type)	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION Specify (a) or (b) [1] Croplands, lakes, streams, food, human exposure, endangered species, other	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED PESTICIDE PERSONNEL c) STATE AND LOCAL d) OTHER PESTICIDES NOT APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. MAINTENANCE AREA B. Russian Thistle Halogetin Sun Flower C. Fire Hazard General Appearance	2,4-D. Low Volatile Ester 6-L Isooctylester of 2,4-D Chlorophenoxy-Acetic Acid Reg. No. 359-411-AA	Solution 94.8%	2 Qts. Per Acre	Hydraulic Sprayer	15 Acres Around Storage Lots and Office Bldgs	A. June Jul-Aug B. Utah	None	A. None B. First Application with Bromacil and Krovar - Spot Treatment with 2,4-D C. Yes D. Yes E. None
A. RAILROAD B. Russian Thistle Halogetin Sun Flower Canadian Thistle C. General Appearance Security Fire Hazard	Krovari Divron 40% Bromacil 40%	Suspensions 80%	10 Lbs Per Acre	Hydraulic Sprayer	85 Acres	A. Apr May B. Utah	None	A. None B. None C. Yes D. Yes E. None

FWGPM FORM 1 (8/74)

F-7

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division

DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO: Donald Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS[1]	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST (include life stage or stage of growth) c) PURPOSE (if crop protection, what crop?)	a) COMMON NAME b) FORMULATION c) % AI AE, OR LB/GAL d) REGISTRATION NO (required)	a) FORM APPLIED (Dust, granule, emulsion, bait, solution, gas, etc.) b) USE STRENGTH (%) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD (Aerial, ground, aerosol, ULV, LL, Other) b) EQUIPMENT (type)	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION Specify (a) or (b) [1] Cropland, lakes, streams, food, human exposure, endangered species, other	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED/CERTIFIED PERSONNEL c) STATE AND LOCAL C[illegible] d) OTHER PESTICIDES BE[illegible] APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. SUPPLY AREA B. Russian Thistle Halogetin C. General Appearance Fire Hazard	2,4-D. Low Volatile Ester 6-L Isooctylester of 2.4.D Chlorophenoxy Acetic Acid Reg. No. 359-411-AA	Solution 94.8%	2 Qts. Per Acre	Hydraulic Sprayer	30 Acres Around All Bldgs and Areas	A. Jun Jul Aug B. Utah	None	A. None B. First Application with Krovar, Spot Treatment with 2,4-D C. Yes D. Yes E. None
A. UTILITY AREA B. Thistle -Canadian Halogetin Russian Thistle Sun Flower Sweet Clover C. General Appearance Fire Hazard Security	2,4-D. Low Volatile Ester 6-L Isooctylester of 2,4-D Chlorophenoxy Acetic-Acid Reg. No. 359-411-AA	Solution 94.8%	2 Qts. Per Acre	Hydraulic Sprayer	16 Acres Around All Bldgs in Area	A. June Jul Aug B. Utah	None	A. None B. None C. Yes D. Yes E. None

FWGPM FORM 1 (8/74)

FEDERAL WORKING GROUP ON PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY: Director for Services Tooele Army Depot
DIVISION: Depot Facilities Division

DATE SUBMITTED: 14 Dec 77
PERSON TO CONTACT/TELEPHONE NO.: Donald Paulich, Ext. 2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS	REMARKS
a) PROJECT NO b) SPECIFIC TARGET PEST (include life stage or stage of growth) c) PURPOSE (if crop protection, what crop?)	a) COMMON NAME b) FORMULATION c) % AI, AE, OR LB/GAL d) REGISTRATION NO (required)	a) FORM APPLIED (Dust, granule, emulsion, bait, solution, gas, etc.) b) USE STRENGTH (%) OR DILUTION RATE c) DILUENT	LBS AI PER ACRE OR OTHER RATE	a) METHOD (Aerial, ground, aerosol, ULV, LV, Other) b) EQUIPMENT (type)	a) ACRES OR OTHER UNIT TO BE TREATED b) NUMBER OF APPLICATIONS c) NUMBER OF SITES d) SPECIFIC DESCRIPTION OF SITES	a) MONTH(S) OF YEAR b) STATE(S)	a) AREAS TO BE AVOIDED b) AREAS TO BE TREATED WITH CAUTION Specify (a) or (b) [1] Croplands, lakes, streams, food, human exposure, endangered species, other	a) PRECAUTIONS TO BE TAKEN b) USE OF TRAINED/CERTIFIED PERSONNEL c) STATE AND LOCAL COORDINATION d) OTHER PESTICIDES BEING APPLIED TO SAME SITE e) MONITORING f) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. TRANSFORMER BANKS B. Russian Thistle Canddian Thistle Sun Flower Sweet Clover Halogetin C. General Appearance Fire Hazard Security	2,4-D. Low Volatile Estcr 6-L Isooctylester of 2,4-D. Chlorophenoxy Acetic Acid Reg. No. 359-411-AA	Solution 84.8%	2 Qts. Per Acre	Hydraulic Sprayer	17 Acres Around All Transformer Banks	A. Jun Jul Aug B. Utah	None	A. None B. None C. Yes D. Yes E. None

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FWGPM FORM 1 (8/74)

Pesticide Usage

Depot Facilities Division

Don Paulich 790-2520

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS	REMARKS
(a) PROJECT NO. (b) TARGET PEST (c) PURPOSE	(a) COMMON NAME (b) % AI OR LB/GAL (c) REGISTERED USE AND REGISTRATION NO. (if available)	(a) FORM APPLIED (Dust, granule, emulsion, bait, solution, gas, etc.) (b) USE STRENGTH (%) OR RATE	LBS AI PER ACRE OR OTHER RATE	METHOD (aircraft, ground, aerosol, ULV, LV, other)	(a) ACRES OR OTHER UNIT TO BE TREATED (b) NUMBER AND DESCRIPTION OF SITES	(a) SEASON OF YEAR (b) STATE OR REGION	(a) AREAS TO BE AVOIDED (b) AREAS TO BE TREATED WITH CAUTION (Creeks, lakes, streams, swamps, aquifers, other)	(a) PRECAUTIONS TO BE TAKEN (b) NO. OF APPLICATIONS (c) USE OF TRAINED/CERTIFIED PERSONNEL (d) MONITORING (e) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	2,4-D	Solution	1 qt per AC 94.8%	Residual	Lawns 26 acres	Spring Summer		26 qts used
	2,4-D	Solution	1 qt per AC 94.8%	Residual	Road shldrs 120 acres	Spring Summer		120 qts used
	2,4-D	Solution	1 qt per AC 94.8%	Residual	Storage lots 254 acres	Summer Fall		254 qts used
	Monuron	Suspension	10 lbs per/Ac 80%	Residual	Railroad bed 115 acres	Fall		1,150 lbs used
	Hyvarx Bromicil	Suspension	10 lbs per/AC 80%	Residual	Whses & sub-stations 100 acres	Spring Fall and Winter		1,000 lbs used
	Hyvarx Bromicil	Suspension	10 lbs per/AC 80%	Residual	Fence line clear Zone 25 acres	Fall and Winter		250 lbs used
Termites	Chlordane	Eml 2%	3 gal per 18"	Sub slab treat-ment	800 gals used	As needed	Active ingredients 73.6%	
Roaches	Drusban	Eml 1%	1 gal per 1000 sq ft	2 gal Hand sprayer	53 gal 53000 sq ft	Jan. Dec.	Active ingredients 41.2%	

FORM FORM 1

[illegible] PEST MANAGEMENT
PEST CONTROL PROGRAM REPORT

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS	REMARKS
(a) PROJECT NO. (b) TARGET PEST (c) PURPOSE	(a) COMMON NAME (b) % AI OR LB/GAL (c) REGISTERED USE AND REGISTRATION NO. (if available)	(a) FORM APPLIED (Dust, granule, emulsion, foam, bait, etc.) (b) USE STRENGTH (% or lbs)	LBS AI PER ACRE OR OTHER RATE	METHOD (Aircraft, ground, aerosol, ULV, LV, other)	(a) GPAs OR OTHER UNIT TO BE TREATED (b) NUMBER AND DESCRIPTION OF SITES	(a) SEASON OF YEAR (b) STATE OR REGION	(a) AREAS TO BE AVOIDED (b) AREAS TO BE TREATED WITH CAUTION (Grasslands, lakes, streams, forests, reservoirs, other)	(a) PRECAUTIONS TO BE TAKEN (b) NO. OF APPLICATIONS (c) USE OF TRAINED/CERTIFIED PERSONNEL (d) MONITORING (e) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Aphids, grasshoppers, Elm beetles, spider mites	Malathion	Eml 2%	17 gal per AC	Buffalo mistiny	(170 AC) 500 gal	May. Sept.	Active ingredients 57%	
Roaches	Diazinon	Eml 2%	1 gal per 1000 sq ft	2 gal Hand sprayer	46 gal 46000 sq ft	Jan. Dec.	Active ingredients 47.5%	

APPENDIX G

PEST CONTROL REQUIREMENTS AND USAGE AT TOOELE ARMY DEPOT

APPENDIX G

PEST CONTROL REQUIREMENTS

Nomenclature & Manufacturer	Requirement
Herbicide, Nonoron Telvar	
Herbicide, Hyvarx Bromacil (DuPont)	907 kilograms per year
Herbicide, 2,4-D (Dow Chemical)	852 liters per year
Herbicide, Princep 80-W	23 kilograms per year
Insecticides, Diazinon, Emul (Octagon Process Inc.)	19 liters per year
Insecticides, Diazinon, Oil (Quaternion Ind.)	57 liters per year
Insecticides, Diazinon, Dust	.5 kilograms per year
Insecticides, Pyrethrum	96 each 12-ounce cans per year
Insecticides, Malathion (Biard & McGuire)	208 liters per year
Insecticides, Dursban (Dow Chemical)	38 liters per year
Insecticides, Dieldrin	
Insecticides, Chlordane	114 liters per year
Insecticides, Warfarin	14 kilograms per year
Insecticides, Lindane, Dust	0.9 kilograms per year
Insecticides, Pentachlorophenol	
Insecticides, Dormen Oil	
Insecticides, Strychnine, Grain	
Lawn Fertilizer, Ammonium Sulfate 21%	

APPENDIX G

PEST CONTROL REQUIREMENTS - (Continued)

Nomenclature & Manufacturer	Requirement
Superior Spray Oil (Was. Chem. Co.)	132 liters per year
Krovar Prod. DuPont Pesticide	680 kilograms per year
Union Carbide Sevin Car Baryl Pesticide	4.5 kilograms per year
Grain Bait, Valley Chem. Co.	45 kilograms per year
Wettable Powder (Ficam W. Gold Crest)	2,098 grams
Malthion, Baird & McGuire	208 liters per year

APPENDIX H

INVENTORY OF INSECTICIDES AT TOOELE ARMY DEPOT (BUILDING 518)